THE · TEACHER'S
ENCYCLOPÆDIA

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EXPLANATION FOR THE ILLUSTRATION: THE APPLE.

Picture I.

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Picture IV.

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Picture V.

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THE TEACHER'S ENCYCLOPAEDIA

VOL. II

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From "The Book of Nature Study."

GROUP OF FLY AGARICS GROWING AT THE FOOT OF A BIRCH

Hard Fern and Mountain Buckler-Fern.

Illustration to the Article on Nature Study by Prof. Bretland-Farmer

THE TEACHER'S ENCYCLOPAEDIA

OF THE

THEORY, METHOD, PRACTICE, HISTORY AND DEVELOPMENT OF EDUCATION AT HOME AND ABROAD

WRITTEN BY MANY OF THE MOST EMINENT EDUCATIONAL WRITERS, THINKERS, PROFESSORS AND TEACHERS OF THE DAY

EDITED BY

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Τὸν κάλλιστ' ἄρα μουσικῇ γυμναστικὴν κεραννύντα καὶ μετριώτατα τῇ ψυχῇ προσφέροντα, τοῦτον ὀρθότατ' ἂν Φαῖμεν εἶναι τελέως μουσικώτατον καὶ εὐαρμοστότατον, πολὺ μᾶλλον ἢ τὸν τὰς χορδὰς ἀλλήλαις ξυνιστάντα.—PLATO, *The Republic*

IN SEVEN VOLUMES

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NOTE BY THE EDITOR

THE general scheme of the "TEACHER'S ENCYCLOPÆDIA," as laid down in the Introduction to Vol. I., is continued in Vol. II. After the opening articles on Child Psychology, Method, etc., in Vol. I., the taking up of the specific subjects in the school was begun by the articles on Kindergarten, the Infant School, Dictation, and Drawing. This volume will be found to be entirely devoted to the further consideration of actual subjects of instruction in elementary and secondary schools. The discussion of these subjects of instruction will be finally completed in Vol. III., which will also contain some general articles still dealing with the Child as a Mind, and thus clear the way for taking up the consideration of the Child as an Animal, in Vol. IV.

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THE

TEACHER'S ENCYCLOPÆDIA

I

NATURE STUDY

By Professor Bretland Farmer, D.Sc. (Oxon.), F.R.S.

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Editor of "The Book of Nature Study."

1. **Erroneous Conceptions of Nature Study.**—There exists in the minds of many people, teachers as well as laymen, much confusion as to what is meant by Nature Study and what are the objects, educational and otherwise, to be kept in view in a course of instruction in this subject. Some look upon it as consisting of a series of elementary lessons in Botany, Geology, Zoology, and the like; others regard it as primarily intended to arouse in the child a love of Nature; whilst others again regard it chiefly as a means of developing and encouraging æsthetic tastes such as will enable it to appreciate the beauties of the world around it. Doubtless a properly conducted course will conduce to all these ends, but they do not of themselves really represent the primary functions of Nature Study.

2. **Observation and Reasoning the Choicest Intellectual Gifts.**—The most precious intellectual gift, with which every child is endowed to a greater or less degree, consists in the ability to reason from observations it has made; and, like the talents of the parable, the original quality is capable of great increase if it is properly used and exercised. Education is largely, though by no means exclusively, concerned with the bringing out and enlarging by means of judicious exercise these faculties of obser-

vation and reasoning. Success in life depends in great measure upon the power of making accurate observations and of drawing correct inferences from them—distinguishing the real from the merely apparent, recognising the relatively important and rightly subordinating the trivial to it. In a word, first the things themselves as they really are, and then these things in their proper perspective.

It is now generally conceded that for the average child mathematics can be made more real by utilising actual objects that can be measured, weighed, and compared. In this way the significance attaching to the operations associated with numerical calculations assumes a more concrete and, to the average mind, a more intelligible form than when they are treated as mere abstractions. The mind of the ordinary child is largely concerned with things that, to it at any rate, are concrete enough, and if it is enabled by observation and experiment to verify and extend its ideas respecting familiar things it is receiving a training which will serve it in good stead throughout its after-life, while at the same time it need not become intellectually bored in the process, as too often happens in much so-called education.

Nearly all children are keenly interested in the phenomena of the world around them, and it is the business of the educator to turn this interest to good account, to use it so as to increase the intellectual powers that are already existent, and to see to it that they do not become diminished or atrophied by disuse or misuse.

3. **Suitability of Nature Study for Training these Gifts.**—Perhaps no class of subjects is better adapted to stimulate the faculties of accurate observation and of correct reasoning than those which are included within the scope of Nature Study. The teacher has the whole world as his oyster, but it is his business to see to it that he serves up the genuine thing and not a mere sham, devoid of all intellectually nutritive qualities.

Nature Study has suffered much at the hands of those who have professed it, for, because the objects are, in some sort of jumble, ready to the hand of every one who is ordered to use them, the incompetence of the teacher has been regarded, erroneously, as inherent in the subject itself—thus showing clearly enough that

the very critics who condemn it have acquired neither the power of accurate observation nor that of correct deduction.

In order that Nature Study may be successfully handled as an educational instrument it is at least as essential as it is in other subjects that the teacher himself should first know what he is about. Unfortunately it is only too true that many teachers are as hopelessly ignorant of the material as they are of the methods and aims of Nature Study.

4. **Teachers themselves should be Well Informed.**—The first necessity for the teacher is that he (or she) should possess a *first-hand* acquaintance with the subject of the lessons. Too often this is replaced by an imperfect acquaintance with text-books, backed up by a deplorable familiarity with diagrams that bear but little resemblance to the natural objects they are supposed to portray. Mere book knowledge is but a poor sort of qualification for embarking on the teaching of Nature Study, seeing that the main purpose of the work is to encourage *first-hand* observations, which in turn provide the material from which *independent* conclusions are to be drawn by the pupils. The substitution of second-hand methods for what should be, to all intents and purposes, original research tends to render the whole course worse than nugatory from the educational point of view. It will, indeed, do positive harm, for it tends in the direction of intellectual perdition.

The overwhelmingly strong claims of Nature Study as an intellectual training depend on its being made a means of encouraging accurate first-hand observation, and on the possibility of testing all inferences and deductions by the touchstone of Nature herself, who cannot lie. Not only is there an intellectual training in all this, but here is a moral one as well. For, properly directed, a child is led to see the supreme importance of rightness and truth—perceived, it may be, at the cost of repeated effort, and even failure, but recognised all the same as the one and only thing that really matters. And the degree of success attained can best be expressed in terms of such a result.

It will be evident from the foregoing that it is not every one who is capable of conducting a class in Nature Study. "*Non cuivis homini contingit adire Corinthum.*" An attempt to saddle

with such a task the teacher who, like Gallio, cares for none of these things, is bound to end in failure. There are, however, plenty of men and women who are both lovers and keen observers of Nature, and it is from the ranks of these that Nature Study teachers should be drawn. It may be objected that it is not always possible to secure this in practice, but under such circumstances it would be better to abandon the subject altogether. It is of no more use thus to attempt it than to get a teacher ignorant of the language to teach French. Not a few of the failures to place the subject on a satisfactory basis from the educational point of view are attributable to the altogether erroneous idea that "anybody" can teach Nature Study.

5. **Nature Study a Means to an End.**—It should be clearly understood at the outset that Nature Study is primarily a means to an end, and this should be kept consistently prominent in the mind of the teacher. Nature Study ought not to *limit* itself to the arousing of interest in the pupil, still less ought it to be regarded as merely a means of amusement. Whilst it will probably provide the amusement, and certainly will stimulate interest, its main object is to *train*; and it is because training can be given by the right handling of everyday facts and phenomena, by the perception of the relation between cause and effect, so that the complexity of involved conditions is first discerned and sometimes, afterwards, unravelled, that Nature Study finds its educational *raison d'être*.

6. **Objects of Nature Study.**—The objects of study are plentiful enough, and many of them are readily accessible to every teacher, whether in town or country, who knows how to use them. And as for the children, whilst they experience the satisfaction that comes from "finding out" things, they are at the same time acquiring just those habits and methods which in after-life will prove so invaluable. Of course the education and training of their faculties will be unconscious so far as the children themselves are concerned, but unless the teacher is gravely at fault the training itself will be very real.

7. **Collecting and its Value.**—Many children take naturally to collecting, but too often the collecting is of the magpie order. The things are put aside without being even properly examined,

and then are forgotten or thrown away. Stones, shells, insects, flowers, are often made the objects of temporary collections. This is a habit that deserves encouragement within reasonable limits, for the spirit of competition will come to the aid of the teacher; but such collections, however large, are quite useless unless something has really been *learnt* from them. To look at an object is a very different thing from observing it. A skilful teacher will take advantage of the "collecting instinct," and encourage the children to carefully describe, draw, and compare the different specimens found during a ramble. It is also as well to encourage the collection of a number of specimens of the same kind of object. When these come to be carefully examined ("observed"), all sorts of similarities and differences between them will be discovered—*e.g.*, granite, chalk, sandstone, will be found severally to exhibit a considerable range of variation in texture and colour—and the perception of this is the first step towards finding out more about each class of object. Where possible it is best to study these rocks in a quarry, a cutting, or in a natural exposure, but something can be done even by utilising a stone-heap. The modes of weathering and the differences exhibited by the various kinds of rocks should be studied, and advantage taken of weathered or broken specimens to learn something of their finer structure. This can especially well be done in an old quarry or a natural exposure (App., Fig. 1), and the children can be shown how soil may be produced by the disintegration of the rocks.

Then the questions as to *why* they disintegrate, and the nature of the cement that holds them together, will naturally come up, and the way will be thus paved for an understanding of the composition and character of mortar, granitine pavements, and other uses of stone for economic purposes. Again, the layers or strata of sandstones, limestones, and other rocks will furnish further material for study (App., Fig. 2), and a hillside road often affords the opportunity of witnessing the processes of stratification in actual operation, by tracing the deposition of the gravel or mud carried down by rain.

Physical conditions, such as frost and heat, ought also to arrest attention. The effects of frost on the ground, the forms

of ice and snow, the meaning and measurement of temperature, a water-pipe burst in cold weather—the study of such phenomena as these will bring the children directly into touch with that " natural knowledge " which forms the foundation of science.

8. **Common Flowering Plants.**—Extending the range of inquiry to another class of objects, a few kinds of common flowering plants will be certain to be obtainable in large numbers. Take, for example, the creeping buttercup. This plant (App., Fig. 3) may be found alike in the ditch, by the wayside, in pasture, in dry and in wet places ; it will show a wide range of variation in size, hairiness, and in other characters, and these can partly be related to the kind of place where the individual specimen grew, but there will be other features in which such a connection is not so clear. The three common buttercups (*Ranunculus acris*, *R. bulbosus*, and *R. repens*) may often be found growing at the same time. They are all obviously buttercups, and their resemblances and differences will form the subject of a useful nature-study, *not* merely botanical, lesson.

The common weeds will provide excellent material for study. *Why* are they weeds ? and still more, why is a particular species a weed in one district and not in another ? Such a question will open up the problems of soils, moisture, and climate, constituting one series of factors, whilst the plant's own methods of multiplication (App., Fig. 4) and spreading form still another series. The daisy in a lawn, dandelions, plantains, and many others are examples that will occur to every teacher of suitable and common objects for observation.

9. **The Distribution of Seeds and Fruits.**—The methods by which seeds and fruits are distributed (App., Fig. 7) will form an attractive and valuable series of object-lessons. But, as in all cases, a discriminating choice of suitable objects should first be made by the teacher, so that the children can for themselves grasp the main principles that underlie the endless differences in detail. Unless a selection is made, and one which is capable of revealing its own story, what might have been a valuable object-lesson will be practically thrown away—confused impressions of indefinite variety are likely to be the only result. The part played by wind, water, animals, and so on, in the process

should be the first step in the classification of the observations made, and then examples might well be shown of obviously related plants showing fundamental differences in their methods of seed distribution. The British species of *Rosaceæ*, for example, furnish excellent material for showing this; but the choice is really a very wide one.

10. **Practical Knowledge required by Teachers.**—It will be well for the teacher to really make himself familiar with the particular mechanism of dispersal. When he has read the matter up in books such as are indicated in the bibliography at the end of this article he will not have taken more than the first step, important as this may be for him. He ought to have seen the things for *himself* before he attempts to lead others to investigate them. A botanical knowledge of the structure of the flower and fruit of common plants will save him from many pitfalls, and will also enable him to avoid the preposterous mis-statements that are often made in comparing these common objects with each other. He will, in a word, be able to put his pupils on the right track for discovering things for themselves, and when he sees them going wrong he will, by skilful questions about the objects themselves, enable the learners to find their own way to the understanding of the things before them. In education generally it is not so much the actual *amount* of knowledge gained, but *the way in which* it is gained, that is the matter of supreme importance.

11. **How Plants take possession of the Ground.**—It may happen that a copse has been cut down (App., Fig. 5) or a bit of woodland cleared. Few opportunities of greater value than this could be afforded for studying the ways plants take hold of the cleared ground (App., Fig. 6). Exactly *what* will come up will depend very much on the soil and also on the drainage of the land. But it is well worth while making a series of observations, extending if possible over several years, of such places. The plants that first swarm over the ground are never those which will permanently monopolise it, and, indeed, after a few years many of the earlier species will have disappeared altogether. If the wood be allowed to grow up again changes will likewise make themselves apparent, and the light-demanding species will

be those that are certain to become extinguished. If a copse or wood is not available, an abandoned gravel pit or brick field will afford rich material for observation, though it will not be so striking as in the example of the wood.

12. **Weeds, Tree-buds, Plane Tree and other Trees.**—Again, the common weeds of the cornfields can well be made the subject of several lessons. There are species which are characteristic of certain types of soils, so that by walking over a field one can tell pretty well what sort of land it is, whether heavy or light, whether rich or poor, sweet or sour.

The marvellous adaptations shown by the winter buds of trees and shrubs are full of interest. They are best studied in spring, when the leaves are just beginning to push. It is possible, by taking specimens more and less advanced, to ascertain exactly how the protective covering is formed. Sometimes it is by variously modified leaves; in other plants, again, it is produced from certain leafy bodies termed stipules.

The plane tree, so often grown in large towns in the south, is specially interesting as exhibiting a rather unusual mode of protection for the winter buds during the summer. In the axil of each leaf a leaf-bud arises, but it becomes overgrown by the base of the leaf-stalk. When the leaves are pulled off in late summer the conical receptacle in which the bud lies is interesting and curious.

The beech, hornbeam, ash, lime, horse-chestnut, birch, and indeed most of our common trees, will afford suitable material for investigation, and the opportunity should always be seized to observe these buds when they are just beginning to unfold in spring. It is much easier to understand them at this time than when they are tightly packed for winter—though for purposes of comparison the less advanced buds should be compared with those that are beginning to unfold, and it is generally possible to collect several stages at the same time.

13. **Germinating Seeds.**—The observations that can be made on germinating seeds and the conditions that accelerate or retard germination, such as temperature, degree of moisture, access of air, etc., if properly carried out, ought to arouse the feeling for the real meaning of an experiment—a question put to Nature.

The careful teacher will not fail to point out that an experiment should aim at asking only *one* question, then Nature will always return the same answer; but, as a matter of fact, most experiments necessarily consist in putting a number of questions at the same time, and consequently the answer (*i.e.* the result) may seem to vary according to the interference of the *different answers* with one another.

It is very easy, and if the children have any preliminary knowledge of elementary chemistry very desirable, to show that animals and plants give out the same gas, carbon dioxide, when they are living. Seedlings placed in a bottle and kept moist with blotting-paper may be shown to consume the oxygen of the air and evolve carbon dioxide by employing the familiar tests of the extinction of a lighted taper and by the turning milky of lime-water. And in this connection the teacher could easily make experiments with cuttings of readily rooting plants (*e.g.* geraniums), and show how much more easily they succeed if placed round the edge of a pot than farther away from it, and how well-aerated soil is a more suitable medium than a wet or impervious one. The children will be able for themselves to reason about these things, and to grasp the principles that underlie many horticultural methods of plant-propagation.

14. **The Right Use of Experiments.**—It must, however, be insisted on that the teacher should not use an experiment merely to verify a statement, but should look on it as a *question*, a question put to Nature, who will always give the right answer to the question *actually put*. It is justifiable, perhaps, sometimes to anticipate what this answer may be; and when an experiment "fails" efforts should be made to discover what the unexpectedly dominant question responsible for the unlooked-for answer (which constitutes the "failure") really is. In this way habits of critical open-mindedness will be fostered, and those qualities which we sum up in the expression "good judgment" will be stimulated and exercised.

15. **The Value of the Aquarium.**—Intelligent observations made on animals such as can easily be kept in an aquarium, the breeding of butterflies and moths, and indeed the keeping of pets in general, can all be turned to valuable account from

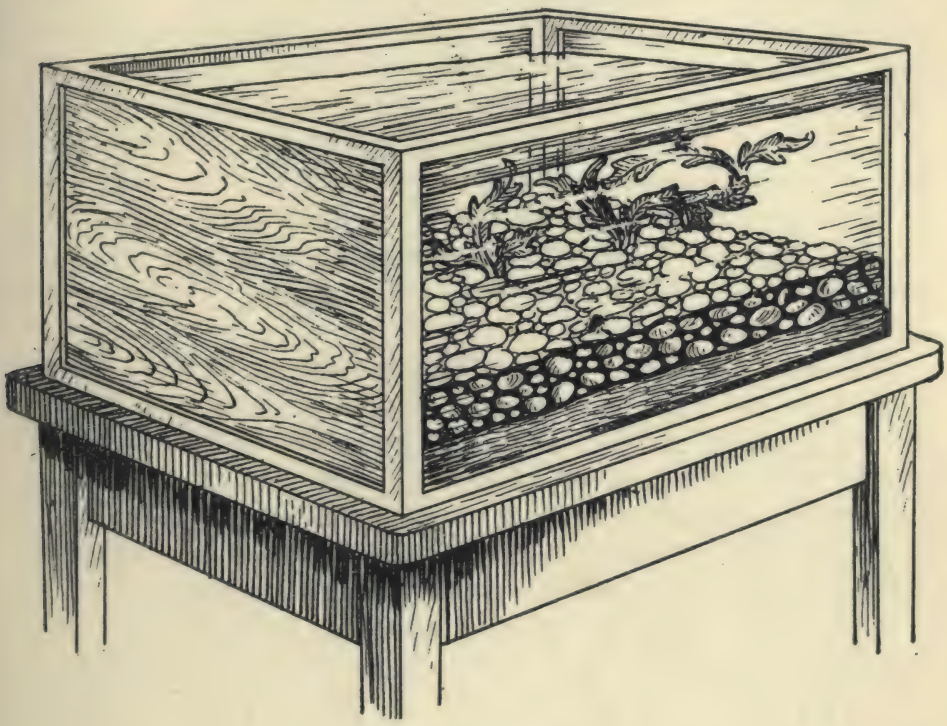
the Nature Study point of view. Aquaria may be easily and very successfully made out of small wooden boxes which have been made water-tight by cement, and the present writer has frequently used such simple structures for this purpose. Indeed, the animals often seem to flourish better in them than in the more elaborate glass vessels so commonly employed. Perhaps this is because the light only reaches the water from above, and so there are plenty of shaded corners or dark recesses into which the various inhabitants can retreat.

About one inch of soil that has just been roughly washed should be placed at the bottom of the aquarium, and this covered by about half an inch of coarse sand. If the water is muddy it can be siphoned out and replaced by clean water by carefully pouring it in so as not to disturb the sand. It is well to put in some water-weed: either water starwort (*Callitriche*) or water milfoil (*Myriophyllum*) will answer well. The Canadian pond-weed (*Elodea*) is apt to grow too luxuriantly. It is important that whatever weed is used it should be stuck well into the soil. It will soon root there, and will thrive much better than if left floating about. When once the aquarium has been started it ought not to require the water to be changed: all that will be needed will be to replace that lost by evaporation, and this loss can be easily and advantageously kept very low by covering the vessel over with a piece of loosely fitting glass. Sometimes the water gets turbid at first, but after being exposed to the light for a few days it will clear, and will remain so with ordinarily careful management.

In such a simple aquarium the larval states of many winged insects—for example, gnats, dragon-flies, caddis-flies, and water-beetles—can be observed, and much may be learnt about them which will serve to lay the foundation for a correct understanding, or at any rate an appreciation, of the wonders of the lower members of the animal kingdom. Studies such as these deserve to be encouraged on the merest utilitarian grounds, for we are continually realising how intimately, and oftentimes unexpectedly, our own welfare is bound up with the understanding, and consequently the control, of the lower forms of life.

16. **The Aphis as a Subject of Study.**—A very good subject

for a lesson on insect life in relation to economic matters can be given on the aphis. Its habits of sucking, its general structure, which can easily be seen with a lens, the relation existing between the wingless and the winged forms (not so easily made out), the rapid multiplication, and the conditions that favour and check fecundity, are all matters that can be profitably studied. The actual knowledge thus acquired will enable any one to gain insight into some of the important relations existing between



THE AQUARIUM.

plants and animals, whilst it will also serve as an introduction to the appreciation of the nature of economic troubles which are apt to ensue from the undue multiplication of any single species.

And in this connection the enemies of the aphis should also receive attention. Commonest among them are perhaps the larvæ of the Ladybirds, also those of the Lacewing flies. Birds —even sparrows—also destroy the aphis on our rose bushes;

and from such an example as this a teacher should be able to lead the children to understand what is meant by the balance of Nature. A single first-hand observation as to how this balance is maintained, and also, when disturbing factors supervene, how easily it may be upset, is far more effective than any number of second-hand illustrations—*e.g.* the well-known and hackneyed instance of old maids and clover in connection with the seeding of the latter plant.

17. **Physical Phenomena as Subjects of Study.**—There are other aspects of Nature Study besides those dealing more directly with animals and plants. Especially there are the physical characters of the earth's surface, and the substances of which it is made up, that in the hands of a skilful teacher can hardly fail to arouse interest and stimulate thought.

Moreover, these branches can be studied in the open, at all times of the year, and the relation of cause and effect can be seen perhaps more clearly than when dealing with the more complicated living things.

The outlines of the features of the local rocks, the modes of their weathering, already alluded to, as well as their relation to the scenery, provide abundant materials which the teacher should not waste. Again, if various sorts of rock occur in the neighbourhood, as happens in most parts of the country, the characteristic differences between them can easily be elucidated by the children themselves from their own observations.

The part played by physical agencies, as well as by plants and animals, in converting the disintegrating rock into soil (App., Fig. 1), should be made out as far as possible, and in this connection the work especially of earthworms will not be overlooked. The worm-casts on a lawn, the prevalence of these animals in a soil rich in humus, and their relative absence where little organic matter is present, are points that will be worth dwelling on. Preying on these lowly soil-animals are others, such as the mole, whose habits also are well worth study. Thus a clear idea may be gained of the nature of the links that cause certain things to be commonly found in association with each other.

A road, especially a hilly road, will furnish many topics of interest. The mode of washing out of the surface after rain, and

the sifting of the particles into coarse and fine, represent on a small scale what is happening in a river system. The deposit of fine silt, where the runnels spread out over flatter ground, closely imitates the characters of a delta, while the steep banks and "scours" of the rapid streams all find their counterparts in the miniature rills which form in the road during rain.

It may be easily shown, by taking a little soil and stirring it up in a fairly large (relatively) quantity of water, that it consists of particles of very different sizes. After stirring well, let the mass stand still for a minute, and then pour off the muddy water into another vessel. A coarse sediment will be found to be left at the bottom of the first receptacle. By allowing the poured-off water to stand and treating it as before, a second and finer sediment will be obtained. The process can be repeated, but it will be generally found that it is difficult or impossible to get the water finally clear of suspended matter, even after some days, particularly if the original soil was of a heavy or clayey character. A comparison made between different sorts of soils on the above lines can be turned to good account, especially if a fairly sensitive balance or pair of scales can be used so as to get an idea of the *quantitative* differences between them on the lines just indicated. In the latter case, of course, the various sediments must be dried by heating on a water bath before they are weighed.

18. **The School Garden.**—Many of the lines of work suggested in the foregoing pages can be pursued much further if there is a garden attached to the school, where the children can have either individual or common plots to work in. Moreover, the whole material of Nature Study assumes a more tangible significance when the knowledge as it is acquired can be turned to practical account. But in managing a school garden some care must be taken to prevent its being cultivated solely on immediately utilitarian principles. It ought to serve far wider purposes than merely to discover who can grow the biggest turnip or produce the finest blossom. The garden is a microcosm, and not only the mechanical preparation of the soil, the *rationale* of cropping, the detection and prevention of pests, etc., should be studied, but the things themselves ought to be made the objects of careful

observation, and the foundations thus laid of a wider knowledge and deeper wisdom.[1]

19. **Advice as to Method.**—Finally a word or two of general advice may be ventured upon. Avoid attempting to do too much at once—let each lesson have a definite central point. Think out beforehand the kind of materials that will most effectively illustrate it from different sides, but avoid falling into the common mistake of overdoing the illustrations. And, above all, refrain as far as possible from giving direct verbal information. Let the objects themselves provide the material for *information*. The proper business of the teacher is with the *education* of the pupils: nothing is less conducive to real education than the sort of teaching which will save a person the trouble of finding and thinking things out for himself. Doubtless the pupil may appear to have covered more ground by being "taught" in this manner, but all the same he will really have been spending his money for that which is not bread, and his labour for that which satisfieth not.

The only kind of education worthy of the name is that which will train the faculties of the pupil so that he may learn not only how to help himself to knowledge, but also how to use it when acquired. And in capable hands there are few educational instruments that can surpass or even equal Nature Study for this purpose.

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School Nature Study: a journal devoted to Nature Study, edited by C. von Wyss. Contains many articles and suggestions of value to teachers.

[1] See Article on School Gardens in *The Book of Nature Study*; also Article on School Gardening in this volume.

APPENDIX

OF

ILLUSTRATIONS WITH EXPLANATIONS TO PRECEDING ARTICLE ON

NATURE STUDY

BY

PROFESSOR BRETLAND FARMER, D.Sc. (OXON.), F.R.S.

SOIL FORMATION, FROM A QUARRY IN HYTHE BEDS

FIG. 1.—Example of soil formation from a quarry in the Hythe beds (Lower Greensand). The lower rocks are stratified, showing they were originally deposited in water. Passing upwards, the rocky character becomes looser, the stones are broken by weathering and the action of roots. Nearer the surface the true soil, formed by the disintegration of the rock, consists chiefly of fine particles, imbedded in which are larger lumps of less friable stone. The colour changes, and the uppermost layers of soil contain increasing quantities of the rotted vegetable detritus which forms the "humus." This last is an essential constituent of all fertile soils. Leaf-mould, which is rich in humus, is a well-known substance that adds to the fertility of soils; but if cold and wet conditions prevail, the development of peat is thereby favoured, and the soil becomes acid. This quality diminishes general fertility, and only certain plants, such as heaths, certain grasses, sedges, dwarf willows, and some others, can thrive in it.

BASALT OVERLYING CALCIFEROUS ROCKS

FIG. 2.—The illustration shows a mass of basalt which has flowed over a bed of calciferous sedimentary and stratified rock. The debris in the foreground mainly consists of masses of the basaltic rock which have fallen out from above. When two types of rock are adjacent, as in this case, an attempt should be made to reconstruct the events that have happened to bring about their proximity. Also a study should be made of the differences in weathering, of the characters of the vegetation, often strikingly different on the two rocks, and also of the special peculiarities often to be seen at the junction of the two rocks.

FIG. 1.—A QUARRY IN THE HYTHE BEDS (*Lower Greensand*)
Showing the passage of hard calcareous rock into soil
(From *The Soil*, by A. D. HALL, published by John Murray)

FIG. 2.—BASALT OVERLYING CALCIFEROUS SEDIMENTARY ROCKS
(*Clogwyn y Person, North Wales*)

FIG. 3.—COMMON BUTTERCUP (*Kanunculus repens*). From *Flora Londinensis*

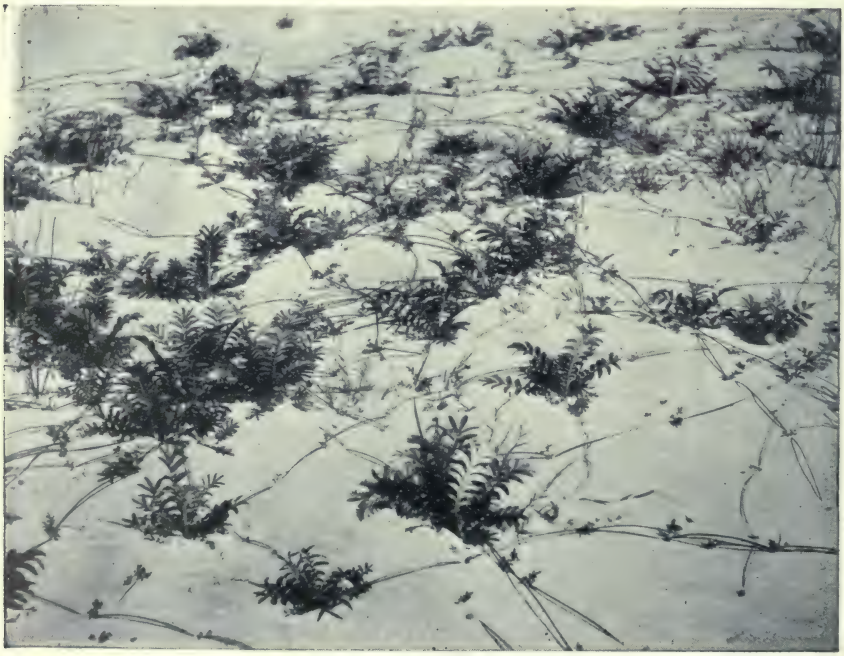

FIG. 4.—SILVER-WEED (*Potentilla anserina*)

THE COMMON BUTTERCUP

Examine Fig. 3, and note the way the roots spring from the knots (nodes) of the stem, which enables the plant to rapidly spread over large areas of suitable soil. The hairiness of the stems and leaves is a variable character, and many specimens show black markings on the leaves. The small figures on the right-hand side show dissections of the flower: 1, the calyx, the outer green envelope of the flower; 2, a petal, with the honey gland at its base; 3, 4, the stamens; inside which is the green pistil, 5; the latter develops to the mass of fruits, 6; an individual fruit is shown at 7.

SILVER-WEED

Fig. 4 exhibits a common weed, the Silver-weed (*Potentilla anserina*) of the roadsides, in a somewhat unfamiliar guise. This weed often forms creeping matted masses on a roadside, but the picture shows it as an efficient binder of sand. The photograph was taken in Canada, on the sandy beach of Lake Ontario, where the sand forms dunes like those which occur in many places by the sea at home. The plant grows very luxuriantly, and the runners may be as thick as a lead pencil. In this country the marram grass, sedges, and dwarf willows form the most characteristic sand-binders on the dunes.

COPSE, WOODLAND WALK

FIG. 5.—The part of the copse to the left has been comparatively recently cut down, and is characterised by a large amount of "coppice" brushwood. This arises from the old plants ("stools") of the trees which have been cut over. The species of flowering plants consist partly of newly invading plants which could not thrive in the shade of the higher bush and tree growth shown on the right of the picture, but there are some species which will be found occurring in the wood on each side of the path. As the shrub growth (whether of hazel, oak, or sweet chestnut) becomes higher and denser, these invaders become killed out, owing to their inability to successfully withstand the diminished light and other conditions which accompany the change from open coppice to denser woodland.

UNDERGROWTH

FIG. 6 is a picture of an extensive undergrowth of Sweet Woodruff (*Asperula odorata*) and brambles in a copse. Woodruff is especially abundant in, and characteristic of, woods on gravels, etc., overlying the chalk districts in many parts of England. It is interesting also to note that the bramble is often practically evergreen when growing in the shelter of a wood.

FIG. 5.—A WOODLAND WALK IN KENT
(*From a photo by M. Wilson*)

FIG. 6.—UNDERGROWTH (*Sweet Woodruff*)
(*From a photo by M. Wilson*)

DISPERSION OF SEEDS

The illustration below shows a number of fruits which are adapted for dispersal by wind. The *development* of the appendages which enable the object to be transported by wind can generally be easily traced from the flower, and the attempt should always be made to do it, as the flattened structures or the hairy feathers are often very different in various plants.

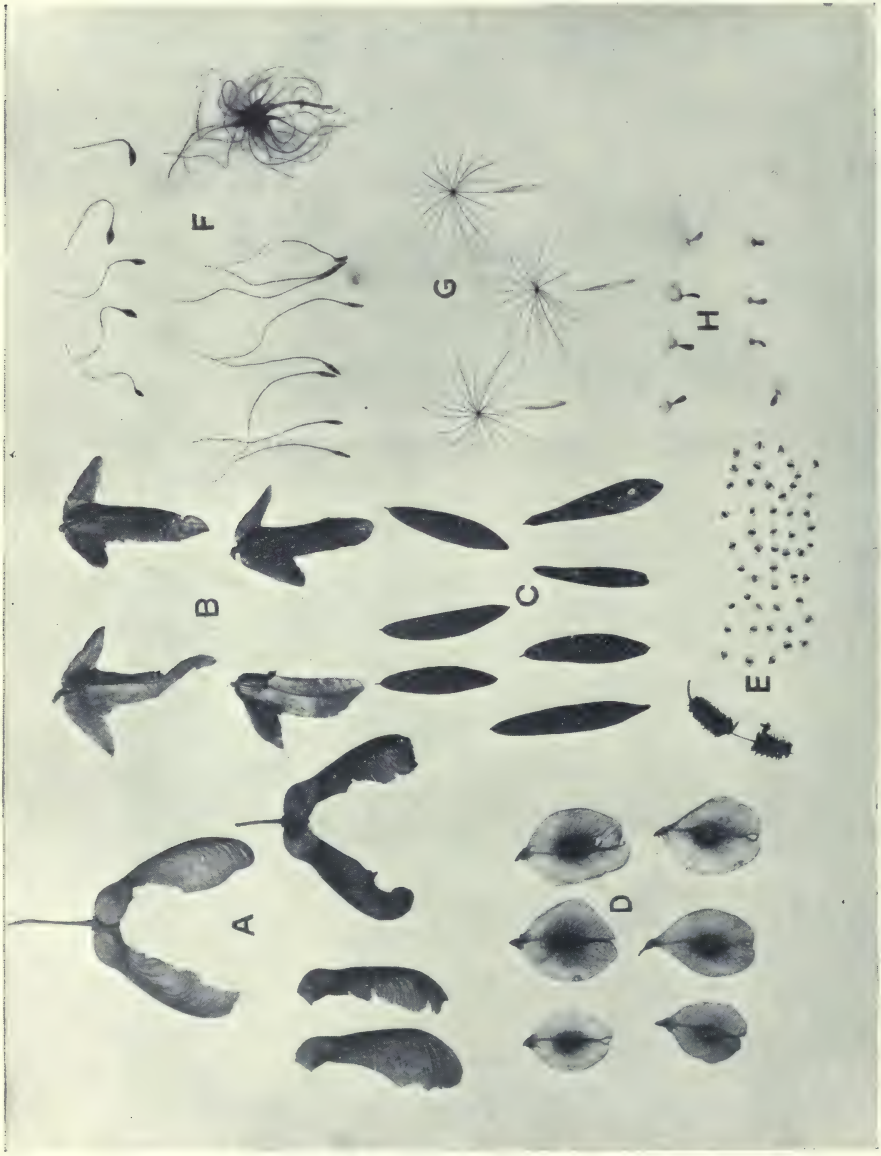

FIG. 7.—DISPERSION OF SEEDS

A. Sycamore B. Hornbeam C. Ash D. Wych Elm E. Birch F. Clematis G. Tragopogon H. Valerian

Below is an example of trees growing partly under the shelter of a bank, and partly above, where they are exposed to the effects of wind. Note that those growing above are, as it were, combed out and flattened, and that the growth is better on one side than on the opposite one. This appearance is due to the action of prevailing and violent wind, and can always be seen in exposed spots near the

FIG. 8.—WIND-SWEPT TREES

sea, the trees often looking as if they had been severely pruned on the seaward side. Specially instructive are groups of trees in such positions. The luxuriance of growth increases as we pass inwards from the outer exposed ones. A similar appearance can often be seen in mountainous districts, where currents of wind, if persistent, produce results like those of the sea-breezes. It should be noted that the general effect of one-sided growth is partly due to the twigs being impelled to grow in the direction of the wind, and partly (and chiefly) to the favouring of those which spring from the lee side of the tree.

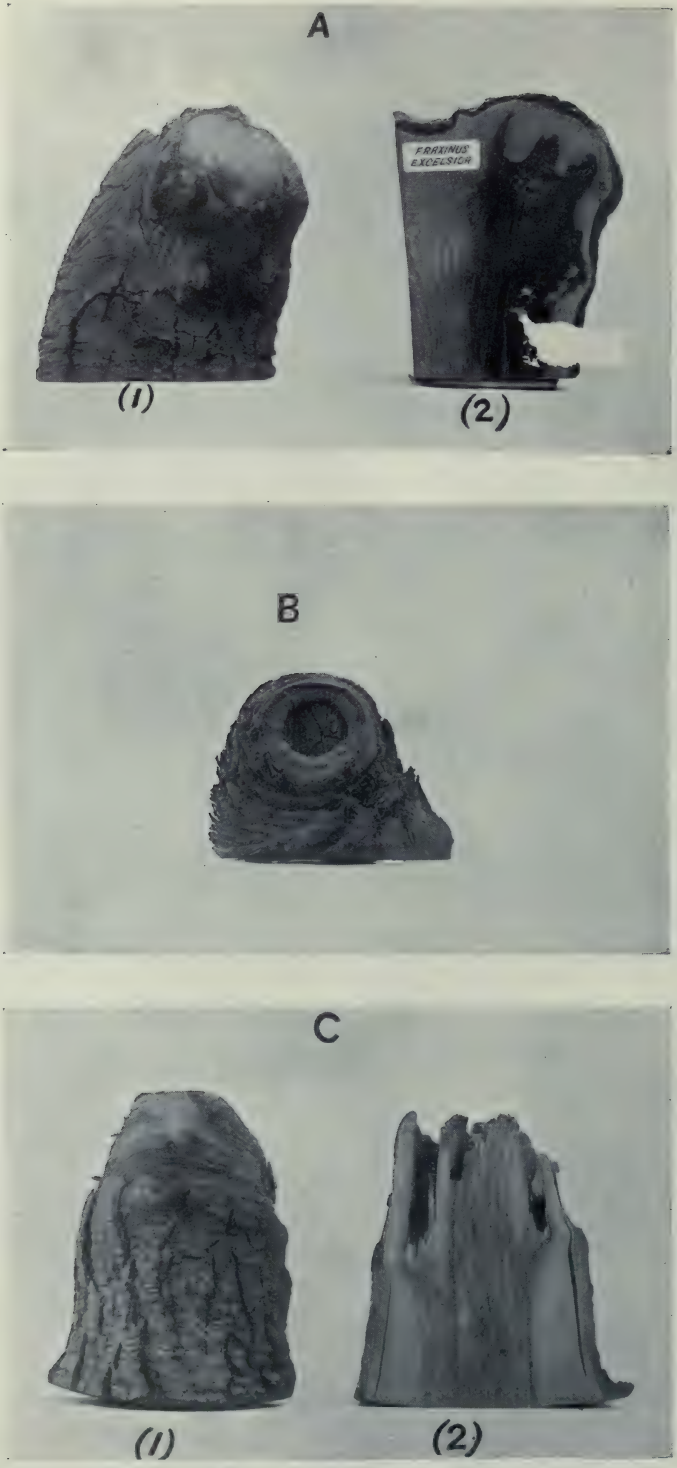

FIG. 9.—WOUNDS OF TREES

WOUNDS OF TREES

Another profitable branch of tree study may also often be studied in the course of a woodland walk—viz. the provision Nature makes for the healing of wounds of trees produced by the removal of branches and other causes.

The illustration, Plate VI., shows how wounds, caused by the removal of branches, may be healed and scarred over in trees.

A. Part of the trunk of an ash, showing the "boss" formed by the overgrowing by living tissue of the wound left by the breaking off of a branch. The "boss" has been cut down the centre: (1) shows the outside, (2) the appearance in section of the object. Note the dark mass in the centre of (2). This is mainly due to decay, owing to the wood of the branch having become rotten before the healing-over was effected.

B. Surface view of a wound which was rapidly healing. The object was taken from a cherry tree from which a branch had been cut off during the previous year. Note how the edges of the healing tissue are growing in towards the centre. "Clean" wounds of this kind always heal more rapidly than those where the surface is jagged or uneven.

C. This is taken from an elm. A branch had broken off near, but not close to, the trunk. The fracture was very uneven, as is seen in the section (2), and decay has set in so far that no healing over ("occlusion") is possible. Note that the healing tissue is growing as a cylinder, and not in such a way as to cover over the wound. This is partly due to the rough surface of fracture and decay of the stump, partly to the branch not having broken off close to the surface of the trunk.

EFFECTS OF WEATHERING

Some of the effects of this weathering may be observed in FIG. 10, which is a photograph of an outlying spur of Snowdon (Lliwedd) in winter. Note the steep cliff with the bank of detritus or scree just at the foot. This scree is composed of fragments of the higher rocks that have been split off, mainly by the action of frost and weather, and have fallen so as to form a steep bank of stones and mud. Below, and especially to the left of the picture, are seen mounds of stones and mud, which owe their existence to the glacier which once extended up the mountain side and filled up the hollow where the lake now lies. These heaps of boulders and mud are the moraines, and they can be observed in almost any of the mountainous districts of Britain, where, at the so-called "glacial epoch," the valleys were filled with ice, much as the higher Swiss valleys are at the present time.

Glaciers often alter their sizes and levels, owing to changes in the climate, and they may thus leave large boulders, as in FIG. 2, which have fallen on to them from the rocks above, perched in all sorts of places over which the ice once spread.

Many of these "perched boulders" can be seen in Wales and in the Lake District. The one shown in the illustration (FIG. 11) is in North Wales, above the top of the Llanberis Pass. The rock on which it is lying has been polished and rounded by the glacier before it gradually melted, as the climate became warmer, and left the boulder in its present position.

FIG. 10.—EFFECTS OF WEATHERING

FIG. 11.—PERCHED BOULDERS

FIG. 12.—CUP FUNGUS (*Peziza*)

FIG. 13.—TOADSTOOLS GROWING ON A TREE-TRUNK

Photos by British Botanical Association. York

FIG. 14.—BRACKET FUNGUS (*Polyporus*) ON A TREE-TRUNK

Photo by Frith & Co., Reigate

FUNGI

FIG. 12 represents one of the common "cup Fungi," which occasionally come up in quantities in the open ground. Some of these are striking in their colour (scarlet and brown). Very many of them are small, but may be always found in the decaying vegetation of damp woods, especially in autumn.

FIG. 13 represents a cluster of Toadstools springing from a tree-trunk. Many of these are dangerous parasites, and cause the death of trees. Such is particularly the case with the various Bracket Fungi (*Polyporus*) shown in Fig. 14. These are often abundant on Birches, where they do much damage. The three Fungi shown in the illustrations are only the fructifications. The growing vegetative part of the fungus (called the mycelium) may be often seen as white strands or sheets of soft tissue by disturbing the substratum from which the fructification springs.

The Frontispiece shows a very poisonous fungus, the Fly Agaric, growing under Birch. It is fairly common in this country, especially in Birch-woods, and may easily be recognised by the little dirty-white patches that adhere to the top of the red cap. It has several less brightly coloured relatives, also common in woods, and they are generally very poisonous.

II

PHONETICS OF ENGLISH

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Introduction.—Phonetics, from the scientific point of view, is the science of speech-sounds, while from the practical point of view it is the art of producing speech-sounds and recognising them when produced. All subjects of school instruction which have to do with speech as speech, with speech looked upon as a physical fact, should, therefore, be taught with due regard to the ascertained facts of Phonetics. The early teaching of reading, the teaching of reading at a later stage, the correction of speech-defects, the alteration of speech-habits, the historical study of the mother-tongue, and the teaching of grammar in so far as it deals with spoken language, must all be based, consciously or unconsciously, scientifically or not, upon the teacher's knowledge of speech-facts.

How to Judge Sounds.—Let us take now three simple words, "papa," "baba," "mamma," and pronounce these while looking into a mirror. We shall *see* that in each case we press our lips and then open them. As far as sight goes, the words are the same, and in each case the *lips* are being used. To the *ear*, however, there are very apparent differences between the words. Let us now grasp the nose firmly and try to say "papa," "baba," "mamma." The first two remain entirely the same to the ear, but "mamma" turns into "baba," exactly as if we had a very heavy cold in our head. The passage of air through the nose is, therefore, an indispensable condition for the production of "mamma"; not only are the lips closed, but the nose-passage must be opened. Let us now pronounce two other words: "file" and "vile." Here we *see* that the lower lip is being used against the upper teeth (note

in passing that it is the lower lip which is brought up against the upper teeth, and not the teeth which are applied to the lip), and that so far as *sight* goes, we can again discern no difference between "file" and "vile." We can, however, *hear* a difference; and further, if we isolate the *f* . . . at the beginning of *f*ile and the *v* . . . at the beginning of *v*ile (not the letters eff and vee, of course, but the sounds), and put our fingers on "Adam's apple," or on the top of our head just behind the temples, we shall *feel* a difference. In the case of f . . . no vibration is felt, in the case of v . . . there is a distinct tremor, depending for its intensity on the amount of air we are expelling from our lungs through the larynx and out into the outer air. Every normal person judges sounds by hearing, by sight and by feeling, although we depend most upon our hearing. If for any reason we cannot hear, we are forced to judge entirely by sight and feeling, and this is what actually happens with deaf-mutes, who are taught what is usually called lip-reading. They watch the movements of the speech-organs as far as these are visible, they feel the vibrations of the teacher's larynx, and try afterwards to reproduce the same movements.

Place where Sounds are Produced.—Returning to our examples "papa," "baba," "mamma," and "file," "vile," and comparing the first three with the last two, we perceive that the groups differ as to the *organs* used, or technically speaking as to *place*. We can see (and feel too) that in saying *p*a*p*a, *b*a*b*a, *m*a*mm*a, we use the *lips*, the lower against the upper, whereas in *f*ile, *v*ile, we use the lower lip against the upper teeth. We say, therefore, in technical language, that the place of p, b, m is lip (the sounds, of course, not the letters pee, bee, em), and that the place of f . . . v . . . is lip-teeth. It is unnecessary to specify that in p, b, the lower lip functions against the upper lip, for that is exactly what one would expect, seeing that when the vocal organs are at rest the one lip is opposite the other. In the case of f, v, it is necessary to specify both lip and teeth, for here the lip is functioning against an organ opposite which it does not lie when at rest. If we ask *Where* is f produced? we get the answer in terms of *place*. *Place* answers the question *where*. There are several different places where sounds may be produced: the

throat itself, the uvula, between the back of the tongue and the back of the soft palate, between the middle of the tongue and the middle of the palate, between the part just behind the point of the tongue and the palate, between the point of the tongue and the palate, between the point of the tongue and the teeth, and finally between lip and teeth or lip and lip.

How Sounds are Produced.—Secondly, if we compare p, b, and f, v, taken by themselves, we shall see that the characteristic part of the production of p, b, is that for the fraction of a second of time the air-passage is entirely closed by the action of the lips, whereas in f, v, the air-passage, though very much contracted by the action of the lower lip upon the upper teeth, is not entirely closed, the breath escaping either between the lower lip and the upper teeth, or, if the teeth are not closely set, through the interstices of the teeth. Technically we call p, b, and the other sounds like them, *stops*, because the flow of breath is stopped for a moment, and f, v, and the sounds like them, *open* consonants, not because the air-passage is wide open—as a matter of fact it is very much more nearly closed than open—but because in spite of the strong contraction of the air-passage a little chink is left open, and this is the characteristic of the class of sounds. We have already seen that the m in " mamma " cannot be pronounced if we tightly close the nostrils. This way of forming consonants is peculiar enough to justify their formation into a special class by themselves, which we call *nasals*. If the mouth-passage (as in m) is entirely closed, and the breath escapes entirely by the nose, we have a nasal consonant. There are two other classes of consonants which still remain to be discussed: the type of consonant which we find in the l in *l*ed, and the type which we find in the r in Scotch *r*ed. In *l* the point of the tongue is placed against the hard palate just behind the sockets of the teeth, on the little projections called the alveolars, and part of the breath escapes to the right, part to the left, or it may be that the whole of the breath escapes either to the right or to the left, leaving in any case the centre passage blocked. To such sounds we give the name *divided*. In Scotch r the point of the tongue hits against the alveolars and then rebounds, repeating the process two or three times. To such sounds we give the name of *trills*. It will

be seen that the stop way of forming consonants and the open way are by far the most important, for the other three ways are merely variations of these two fundamental ways. Nasals have mouth-passage *stopped*, nose-passage *open*. Divided sounds have centre passage *stopped*, side passage or passages *open*. Trills consist in a rapid alternation of stop open. The classification of consonants into stop, open, nasal, divided, trill, receives the name of the classification by *mode* or form. The question to be asked here is not *Where* is the sound produced? but *How* is it produced? or what is the shape of the resulting air-passage?

Voice and Breath.—Thirdly, if we take once again the pair *f*ile, *v*ile, we find that f and v are identical in place (lip-teeth), identical in form or mode (open), but differ in that f is unaccompanied by any vibration in the larynx, while v is accompanied by this vibration. (For the physiology of the vocal organs see article on Child Physiology.) Breath acted upon by the vibration of the vocal cords we call phonetically voice, hence we say that f and the consonants like it are breathed or voiceless, v and the consonants like it voiced. There is a state of the glottis intermediate between breath and voice, where the glottis is narrowed without vibration. This we call whisper. Practically whisper is unimportant. In English we whisper the sound at the end of "judge"; in French final i and final u are often whispered.

Organic Definitions.—It will be noticed that for the purposes of definition we go back to these questions of fact. We talk of voiced and voiceless, not of hard and soft, because the presence or absence of voice can be tested objectively, but a sound may be hard to one person's ear, soft to another's. Our point of view is in a word organic or genetic, not acoustic. Not that one may neglect the acoustic side. Complete sound supposes a producer, a medium, and a recorder, and if the producer be the voice and the recorder be the ear, both are of interest to us. But for the purpose of definition we go to organic formation.

Question of the Script.—What we have now to do is to take the consonants of the particular dialect of the mother-tongue we speak, and analyse them by asking our three questions: Where is each produced? How is it produced? Is it voiced or voiceless? For example: p is lip-stop-voiceless, b is lip-stop-voiced, m is

lip-nasal-voiced, f is lip-teeth-open-voiceless, v is lip-teeth-open-voiced, and so on. But one can easily see that it would be extremely inconvenient, every time we want to refer to the sound p, if we had to write out "lip-stop-voiceless." We must adopt some kind of notation to fix our results, as far as a notation can fix results, after we get them. The phonetic notation we have here chosen is the International, with some slight modifications to suit the vowel rectangle—the system best known in England, more especially by those engaged in teaching modern languages. The principle of the International phonetic alphabet is: one letter for every sound, and one sound always represented by the same letter.

Faults of English Spelling.—The phonetic alphabet is in fact a perfect alphabet, not like our ordinary English alphabet, which sins in various directions. In English we write letters for which there is no equivalent in speech, as for instance "though," "through." We speak sounds for which we write no letter, as for instance the Southern English pronunciation of n*o*, which is diphthongal and should therefore be written in three and not in two. We write two letters for one sound, as for instance th in *th*in and *th*en, with the result that we can never be sure in proper names whether the two letters are to be interpreted as one or not—whether it is Grant-ham or Gran-tham, Chat-ham or Cha-tham. On the other hand we write one letter for two sounds, as for instance "box," where x stands for ks. This is much the same mistake as No. 2, only that most people are conscious that they are producing two sounds at the end of "box," and few Southern English people are conscious of the diphthongisation of their o. Finally we use the letters we possess in a very illogical way. Think of c, k, q, and s. We could simplify these by making k always stand for back-stop-voiceless as in *c*at, and s always stand for the sound in *s*at; and then a word like "quack" would start off with kw, and end up with plain k; for there is no reason why we should write both c and k for one sound.

How the Perfect Alphabet is made.—For our perfect alphabet we shall require all the superfluous letters, like c and q, for we possess no single letter that we can appropriate—for example, to

the sound at the beginning of *sh*all—and we shall have to use other expedients, such as adding diacritic marks, making new letters or borrowing them from other alphabets, giving different forms conventional values, turning letters upside down, introducing capitals with a special value attached to them, and so on. Our alphabet must be international, with slight differences which we can define once and for all at the beginning of our texts. For example, p always means lip-stop-voiceless, and at the beginning of a German text we should simply state that p in North German is always pronounced initially with a slight puff of breath, that is, $p = p^h$. But it is unnecessary to write p^h right through the text, for no phonetic transcript, however accurate, can give all that the living voice conveys, and we must resign ourselves to partial inaccuracy. We must also make up our minds that the new alphabet will look strange to our eyes for a little time, and that, being international, some of the letters will not fit in with our national habits. x, for example, in English means either *gz* (e*x*ample), or ks (bo*x*), or z (*X*erxes). Being a superfluous letter, we appropriate it for the sound at the end of the Scotch lo*ch* (not the English pronunciation of the word, which is the same as that of lo*ck*). ç again in French means always s, but because it is a superfluous letter we appropriate it for something else, namely the sound at the end of North German i*ch*. Now it is troublesome, no doubt, for a Frenchman to accustom himself to the idea that ç can denote anything else than s ; but it is impossible to arrive at any international agreement now, without sacrifice being made. In music we are fortunate in having an international understanding, if not for the marks of expression, at least for the actual notes used. The idea that the third-space treble clef could mean one thing in England, another in France, and another in Germany, seems to us frankly absurd. And yet it is this frank absurdity which most of us cling to in language. Take such a proper name as Calvin Thomas. It may be English or French or German. How are we to pronounce it ? We cannot tell even approximately until we know to what language it is supposed to belong.

Analysis of Consonants.—Having thus settled the principle of our notation, we may now proceed to the analysis of our

consonants, asking in each case the three questions: Where is it produced? How is it produced? Is it voiced or voiceless?

Lip Consonants.—p we already know is lip-stop-voiceless; b is lip-stop-voiced; m is lip-nasal-voiced. There are, however, two more lip consonants which we may possess. If we take a spoonful of hot liquid and "blow to cool," we are really producing a consonant which we can define as lip-open-voiceless, for we are using the lips, contracting the passage without entirely closing it, and not using voice. Besides, if we are Scotch and use "im*ph*m" as a substitute for "yes," we are really pronouncing in the middle of the word lip-nasal-voiceless, for we close the lips entirely, or rather keep them closed from the preceding m, divert all the stream of breath through the nose, and do not use voice. We may use F to denote lip-open-voiceless, and m̥ to denote lip-nasal-voiceless, where the diacritic ̥ has been borrowed from Melville-Bell's Visible Speech symbols, afterwards adopted by Dr. H. Sweet, and signifies open vocal cords, no voice.

Lip-back Consonants.—Take now the examples "which," "witch," which in ordinary non-elocutionary Southern English are pronounced in the same way. Here we are using the lips but at the same time raising and retracting the back of the tongue, as we can easily test by isolating the w sound, and inserting into the mouth the tip of the little finger, or the end of a pencil. The place of w is lip-back; it is open and voiced. In Scotland the sound represented by wh is lip-back-open and voiceless, and it is instructive to compare this sound with lip-open-voiceless or "blow to cool" as it is sometimes called. We represent the Scotch sound by ʍ. It is as well to note that teachers of elocution generally insist on ʍ for wh, and the reader will do well to notice what is his own practice as well as that of the people about him.

Lip-teeth Consonants.—*f*ile and *v*ile contain lip-teeth-open voiceless, and lip-teeth-open-voiced respectively. Sometimes m before f (as in "emphatic") becomes lip-teeth, instead of lip; but that we may at present ignore.

Point Consonants.—*r*ed contains point-trill-voiced, or it may be point-open-voiced if the point of the tongue fail to touch the palate behind the teeth. *l*ed contains point-divided-voiced; *d*o contains point-stop-voiced and *n*o point-nasal-voiced. These

sounds we denote by r, l, d, and n. r is often unvoiced after t, for example in true, try, l much less often after k, in clay for example. t in *t*oo is point-stop-voiceless, and is denoted by t.

Point-teeth Consonants.—In *th*in, *th*en, we find point-teeth-open-voiceless, point-teeth-open-voiced, and these we denote by θ, ϑ. They may be formed in two ways. The tongue may be placed just behind the upper row of teeth, or it may be placed between the two rows of teeth, forming the variety usually known as the interdental variety. The breath may escape between the tongue and the teeth, or through the interstices of the teeth. The reader can easily observe in a hand-mirror which of the particular varieties he possesses. The interdental variety, though probably the rarer type, is easier to teach to foreigners, who do not naturally possess θ and ϑ. It is also the easier type to teach to children who are in the habit of saying "I *f*ink" for "I *th*ink," or "*f*umb" for "*th*umb." It should also be noted that some people pronounce t, d, l, and n point-teeth instead of point, and many more tend to pronounce l and n point-teeth if θ or ϑ follow, as for example weal*th*, te*nth*. Here again the reader should observe himself and others.

Blade Consonants.—*s*o and *z*ero contain sounds formed with the part of the tongue just behind the point, technically called the blade. They are open and voiceless, open and voiced respectively. One of the best ways to convince oneself of their place of articulation is to pronounce s while breathing out, and then without changing the shape of the mouth pronounce it while breathing in. The colder air strikes the part of the tongue used, and brings home to one where the sound is being formed. We denote the sounds by little s and little z.

Blade-point Consonants.—*sh*all and meas*u*re contain sounds formed with a much larger part of the tongue's upper surface; their place is blade-point. They are open and voiceless, open and voiced, respectively. We can convince ourselves of their place by in-breathing, as in the case of s, z, and we denote them by long ſ and long ʒ.

Front Consonants.—*y*ou contains a sound formed between the middle of the tongue and the hard palate, a place generally called front. It is open and voiced. The Scotch pronunciation

of *h*ue contains the corresponding voiceless consonant. Note again what your own pronunciation is. The notation is ç for front-open-voiceless, j for front-open-voiced.

Back Consonants.—*c*oat contains back-stop-voiceless, *g*oat back-stop-voiced, si*ng* back-nasal-voiced. The Scotch pronunciation of lo*ch* is back-open-voiceless. These sounds are denoted by k, ɡ, ŋ, x.

The Uvular Trill.—If the uvula is made to trill against the tongue as in the case of the speech-defect called a burr, we have uvula-trill-voiced, denoted by R.

The Throat Stop.—Finally in the vulgar Scotch pronunciation of words like butter, water, we find throat-stop-voiceless, and if this is strengthened and spasmodically repeated, it develops into the ordinary cough. We denote it by ʔ.

The Aspirate.—The aspirate h, as in him, though reckoned for convenience among the consonants, is hardly a consonant, for it has neither place nor form. It is voiceless, and may be defined as stressed unmodified breath. It is written *h*.

Table of Consonants

	1 Lip.	2 Lip-back.	3 Lip-teeth.	4 Point.	5 Point-teeth.	6 Blade.	7 Blade-point.	8 Front.	9 Back.	10 Uvula.	11 Throat.
Voiceless											
Open	F	ʍ	f	r̥	θ	s	ʃ	ç	x		
Div.				l̥							
Stop	p			t					k		ʔ
Nas.	m̥										
Voiced											
Open		w	v	r	ð	z	ʒ	j		R	
Div.				l							
Stop	b			d					ɡ		
Nas.	m			n					ŋ		

From this point all letters used to denote sounds are enclosed in square brackets.

Common Mistakes to be Avoided.—Before proceeding further in our phonetic analysis, let us now inquire how what we already

know can be used in ordinary school teaching. The first mistake to be avoided is talking of sounds in terms of letters, instead of in terms of sounds. The clear principle to be followed is: In referring to sounds, either give the sound by itself, or define it. For example, teachers commonly talk of the sh- (ess-aitch), the wh- (double-you-aitch), the th- (tee-aitch), the ng- (enn-gee), the qu- (cue-you) sounds, and quite forget that these are names of *letters*, and not *sounds* at all. Instead of giving these roundabout and sometimes quite misleading combinations of letters, give the sounds themselves. Make the sound of hushing, and talk about the [ʃ] sound.

Or again, people commonly talk of hard and soft g, of hard and soft c, of soft ch. Now hard g is back-stop-voiced [ɡ] (as in *g*ood). Soft g (as in a*g*e) is a combination of point-stop-voiced (practically [d] as in *d*o) with blade-point-open-voiced ([ʒ] as in measure). Hard c is back-stop-voiceless ([k] as in *c*oat). Soft c is blade-open-voiceless ([s] as in *c*ity). Soft ch as in *ch*urc*h* is point-stop-voiceless ([t] as in *t*oo) plus blade-open-voiceless ([ʃ] as in *sh*all).

Again, if a child pronounces ridin' for riding, readin' for reading, he is generally told "not to drop the g" (gee)! Now there is no "gee" in the case, except the *letter* g. What the child is really doing is substituting one nasal for another nasal, the sound at the end of "sin" for the sound at the end of "si*ng*," *point*-nasal-voiced for *back*-nasal-voiced. The correction should take the form: Give me the sound at the end of si*ng* instead of the sound at the end of si*n*.

Dropping the "h."—Another common inaccuracy is that if a person pronounces 'Ighgate for Highgate, people say that he is dropping an h (aitch). Now in the first place h (aitch), as we already know, is [h], stressed breath. All that people do, then, who "drop their h's" is to shift the stress from the slight escape of breath to the following vowel. And if we observe ourselves and others, we shall easily convince ourselves that we constantly drop h's in unstressed words, and that dropping h's is a vulgarism only when the stress is shifted in important words. The same difficulty comes up in the case of words like which, witch. If a person pronounces these words alike, and the overwhelming

majority of Southern English speakers do so, he is said to "drop the h" (aitch). Now the difference between Scotch [ʍ] and Southern English [w] is that Scotch [ʍ] is voiceless and S. English [w] is voiced. Matters are not made any better by saying that in Scotch "people pronounce the h (aitch) before the w (double-you), not the w before the h." This last statement is doubly incorrect; the subject-matter is false, and, as usual, there is no attempt made to distinguish sounds from letters.

Other Inaccuracies.—The ordinary use of the terms guttural and dental is open to grave objections. Guttural is used to describe the sounds k, g, and ng. But [k], [ɡ], [ŋ], as well as [x] in Scotch lo*ch*, are *back* sounds, being formed in the mouth between the back of tongue and soft palate, and not in the throat, unless indeed we mean by that, that [ɡ] and [ŋ] are voiced. Dental is used to describe "t, d, th, the trills l and r, the nasal n, and all the sibilants" (Mason). Of these only th (that is [θ] in *th*in and [ð] in *th*en) is truly dental; the others are partly point [t], [d], [l], [n], [r], partly blade [s], [z], partly blade-point [ʃ], [ʒ].

Popular speech is inaccurate in describing a person with a heavy cold in the head as "speaking through his nose." He cannot do so, for the nose-passage is more or less closed. Hence all his nasals are denasalised and turn into the corresponding stops, [m] into [b], [n] into [d], [ŋ] into [ɡ]. A sentence like "Mary Jane sings" is transformed into "Bary Jade sigs," and this peculiarity is often used to obtain a cheap comic effect.

Childish Mispronunciations.—Let us consider now the ordinary mistakes of childish English, and how they can be rectified. Many children when they come to school say "I *f*ink" for "I *th*ink," "my *f*umb" for "my *th*umb," "I *t*alls it" for "I *c*all it," "a *l*ed *d*ess" for "a *r*ed *dr*ess," and so on. Now the safe principle in correction of sounds is: Know first what sounds the pupil possesses, know what sound you wish him to acquire; work, as always in method, from the known to the unknown. Take the *f*ink pronunciation first. The sound the pupil possesses is lip-teeth-open-voiceless; the sound you wish him to acquire is point-teeth-open-voiceless. The two sounds are identical, except as regards place. What one should say to a pupil like this would be: Put your tongue between your teeth (the interdental

is the more marked variety) and gently blow. The substitution of [t] for [k] is a case of the same kind. [t] is point-stop-voiceless, [k] is back-stop-voiceless; the two sounds are identical except as regards place. What the pupil has to do is to produce a voiceless stop with the back of his tongue instead of with the point. See if he possesses any back sounds ([ɣ], or [ŋ], or [x]). (Probably a child who says "*t*alls" for *c*alls, will say "I'se *d*ot it," for "I've *g*ot it"). If he does, work from the back sounds as well as from [t]. Say to him: Try to make a [t] where you are making [ŋ].

The mistake of using [l] for [r] belongs to a different category. [l] is point-divided-voiced, [r] is point-open-voiced, or point-trill-voiced. It is not the place we wish to change here, but the mode. Some teachers would advocate the practice of [t] [d], [t] [d], with a view to producing something like the rapid alternation of stop open, stop open, which is, as we know, the characteristic of the trill. A better plan, however, is to make the child say [z], then insert the end of a penholder or a small paper-knife so as to turn up the point of the child's tongue. The sound obtained will be very like the so-called inverted [r] which is common amongst Caithness speakers. This [r] only requires the tongue to be pushed a little farther out till it reaches the alveolars, and we shall then obtain point-open-voiced, the most common Southern English variety. The same treatment can be tried with children who have the speech-defect called a burr. The great difficulty here is to keep the uvula still, for it sometimes persists in moving, even along with the point of the tongue. No very useful purpose is served in discussing whether children know they are pronouncing sounds wrongly. Probably the acoustic impression, say of [l] and [r], is to them much the same, and after having once given a faulty imitation of the sound they hear, they tend to stereotype their mistake. It is interesting to note that grown-ups' mistakes in language follow the same lines as the children's. If an Englishman says lock for loch, he is substituting back-*stop*-voiceless for back-*open*-voiceless, changing the form of the sound but keeping the place unchanged. Frenchmen, unless carefully taught, substitute [t] for [θ] and [z] for [ʒ], while Germans sometimes substitute [d] for [ʒ]. Low Latin **l*usciniolum in its

transition to French became *r*ossignol, while L. pe*r*egrinum gives French pè*l*erin and our own pilgrim.

Lisping is one of the most easily corrected speech-defects. The lisping child says [*θ*] for [s], [*ð*] for [*z*], thus overshooting the mark. As before, insert the end of a penholder or the edge of a paper-knife, and gently push the tongue into position. It is easy to push a sound farther back, not so easy to draw it forward.

There are finally quite a number of children's speech-defects which require medical treatment (see article on Child Physiology, § XII.). The teacher's chief business here is to watch that the child does not relapse into bad habits, and in the case of stammering or any nervous affection of the speech organs, to take care that the stammering child is not in any way hurried, and especially that his breathing is good.

The Teaching of Reading.—The question which next presents itself for our consideration is : How are we to attack the problem of the teaching of reading and writing, and what part is our phonetic knowledge to play in the accomplishment of this task ? In English the problem is complicated by the fact that our traditional spelling is in many cases far removed from the sounds it is meant to represent. The principle of our spelling is, however, alphabetic, and not pictorial, like Chinese. We represent by a certain succession of marks in space a certain succession of sounds in time, and do not give a rough representation of a mouth and a field when we wish to indicate happiness—the Chinese notion of happiness being one mouth and the produce of a whole field to feed it ! What the normal child brings with it into school is a certain knowledge of its spoken mother-tongue, a very imperfect knowledge, whether one considers it from the point of view of phonetics, of grammar, or of vocabulary. Our business, as educators, is to take what the child brings, break it up into its elements, and having thus clarified and ordered what the child brings, to build up new knowledge with these elements. So long as we confine ourselves to sounds as sounds, this breaking-up process presents no great difficulties. It is only when the representation of sounds must be begun that we reach really difficult ground. Some few enthusiasts advocate the use of a

simple phonetic alphabet, such as we have given here, and would make the transition to historic spelling later. One German methodist (Spieser) draws rough sections of the head to show the positions of the vocal organs when each sound is being produced, and adds the letter for the sound afterwards. But sooner or later, as things are just now, until the era comes when each one shall be free to represent his own speech according to definite principles, our pupils must attack nomic spelling.

Miss Dale's Method.—One of the most successful attempts of late years to pick out simple phonetically written words and utilize them for the early teaching of reading is that of Miss Nellie Dale.[1] Miss Dale begins with the stops (p), [t], [k], [b], [d], [ɡ] and the corresponding nasals [m], [n], [ŋ], and combines these with short vowels. The presence or absence of voice is indicated by colour. The voiceless sounds, the "sister"-sounds, are printed in blue; the voiced, or "brother"-sounds, in black upon white paper or white upon the blackboard. Silent letters are printed in brown. The difficulties arising from the discrepancies between historic and what would be phonetic spelling are got over by little fanciful stories. [k], for example, is represented in English by c, k, and q. c the children called the "fat baby," probably an allusion to its shape. q, the children were told, always liked to sit next another letter, and this led to their calling it the "cry-baby." k was the tall sister, and in such a word as "pack" the difficulty of three sounds being represented by four letters is overcome by the ingenious explanation that "the tall sister is taking the fat baby out for a walk."

Difficulties with regard to the Voiceless Stops.—In the working out of this particular lesson on the stops, there is a further difficulty which proceeds from the nature of the voiceless stops. A voiceless stop is inaudible except in its transition from or to another sound: or in other words the closure of the voiceless stop is, like the rest in music, cessation of sound. Hence, when we isolate the sounds in such a word as "pip," we should strictly speaking only close our lips silently for the two [p]s, and pronounce the i-sound aloud. The children would *see* the sound [p], although

[1] "The Walter Crane Readers": *Notes on the Teaching of Reading*, and *Further Notes*. Philip, 4*d*., 8*d*., 9*d*., 1*s*., 1*s*. 3*d*., 2*s*. 6*d*., and 3*s*. net.

they could not *hear* it. But when we must isolate [t] and [k], by putting the point of the tongue silently against the alveolars, or the back of the tongue silently against the soft palate, the teacher can *feel* the sound, but the pupils can neither *see* nor *hear* it. Practically it would be quite allowable to pronounce the [t] and the [k] aloud, although we know that in the word they stand for cessation of sound only. Some of the German methodists (like Spieser or Berthold Otto) avoid the difficulty by always using the description of the sound instead of isolating it. The teacher says, Give me point-stop-voiceless, not Give me [t]. This plan is certainly more scientific, but the question arises whether it is not too scientific for the ordinary school-child, who is quite satisfied with less approximation to truth.

Miss Dale's Method (continued).—Miss Dale avoids the ordinary names of the letters, and breaks up the words taught into their sounds. In order to meet the difficulty of the different letters which in English are employed to render one sound, she attaches to the sound the word where the particular representation of the sound has been first met with. Instead of talking about k, c, and q (kay, see, and cue), she talks of the *k*ing [k], the *c*at [k], and the *qu*ack [k]. Miss Dale is no rigid theorist. Such a word as " the " she takes as a whole after it has once been decomposed. (For full details as to the working out of the system see the books quoted above.)

The Phonetic Minimum.—Even those who are disinclined to go the length of building up a whole system of teaching to read upon a phonetic basis would do well to ensure that their pupils have an elementary knowledge of the difference between voiced consonants and voiceless ones, and some consciousness of mode and of place. Any time spent on this part of the work is time well spent. The pupils will soon enough approach the type of the adult reader, who reads words as wholes, and is not, as a rule, much disturbed by misprints. The practised reader of music also reads his chords as chords and not as single notes, but it is most important that the pupil who is only at the stage of deciphering single notes should decipher them accurately.

Grammar of Spoken English.—Two points of the grammar of spoken English fall to be treated under this head : the genitive

singular and the regular plural of nouns, and the past tense and past participle of verbs.

Plural of Nouns.—(1) Nouns which end in [s], [z], [ʃ], or [ʒ], add a syllable to form their genitive singular and their plural: brass, buzz, brush, judge. (2) Nouns which end in any *voiced* sound other than [z], [ʒ], add [z]: way, dog. (3) Nouns which end in any *voiceless* sound other than [s], [ʃ] add [s]: book, cat.

Some words ending in [θ] and [f] take [z] in the plural and change [f] into [v], [θ] into [ð]: loaf, bath. Some words are quite irregular in the plural. "House" adds a syllable and changes [s] into [z]. The regular genitive plural is the same as the genitive singular; in words like loaf, bath, the genitive plural is the same as the common form of the plural; the irregular plurals add a syllable or [s] or [z] to the plural form. The inflection of 3rd sing. pres. indic. of regular verbs follows these same phonetic rules.

Past Tense of Verbs.—If the verb ends in [t] or [d], an extra syllable is added to form the past tense and past participle: paint, blend. If the verb ends in any *voiceless* sound other than [t], [t] is added: hush. If the verb ends in any *voiced* sound other than [d], [d] is added: bang, play.

There are a good many exceptions. Some verbs have double forms: learnt, learned. Some change final [d] into [t]: bend. Some add [d] or [t] with vowel-change: hear, creep. Some drop their final consonant before the ending, with vowel-change before [t]: make, bring.[1]

Consonants and Vowels.—Up till now we have been using the word "consonant" without having defined it. Now, when we proceed to the vowels and their analysis, we must define our terms. Consonants are not, as is popularly supposed, letters which require the aid of another letter to sound them. Consonants, as well as vowels, can be isolated and pronounced by themselves. Vowels are normally the result of breath acted upon by the vocal cords and further modified by the mouth, though in such a way as not to produce any audible friction. "Consonants

[1] For a full treatment of both these points, see Sweet, *Primer of Spoken English*, Oxford, 1900 [3], 3*s.* 6*d.*; and Wyld, *Elementary Lessons in English Grammar*, Oxford, 1909, 2*s.*

are the result of audible friction or stopping of the breath in some part of the mouth or throat." [1] Now, seeing that the number of positions of the mouth is infinite, and each new position of the mouth gives rise to a different vowel-sound, the number of vowels is infinite. Hence, when it is stated that in English there are five vowels, a, e, i, o, u, or sometimes seven, if we count certain uses of w and y, this statement is true only of letters, not of sounds.

Vertical Position of the Tongue.—Out of the infinite number of vowels we must now choose types, fix these types as far as possible, and refer all other sounds to them. Take, for instance, such a pair as "bit," "bet," and isolate the vowel-sound in the middle of the words, taking care not to change it. We shall find that in passing from the vowel in "bit" to the vowel in "bet," the tongue is lowered. If we now isolate the vowel in "bat" (Southern English pronunciation, not Northern English nor that of many parts of Scotland) we shall find that the tongue is still more lowered. The first criterion, therefore, which we shall apply is: Where is the tongue in the mouth according to its vertical position? and we distinguish three main positions—*high*, where the tongue is as near the roof of the mouth as it can be without producing audible friction and so turning the vowel into a consonant; *low*, where the tongue is as low in the mouth as possible; *mid*, where the tongue is midway between these two typical positions. In practising such a series as the vowels in "bit," "bet," "bat," it will be found that the jaw is gradually lowered as well as the tongue. This is not necessary, though very natural, as can easily be proved by placing the little finger between the two rows of teeth. The series can perfectly well be produced with the finger in this position, the angle of opening between the jaws remaining unchanged.

Horizontal Positions of the Tongue.—Take now such a pair as "beat," "boot." Isolate the vowels. In the case of the vowel in "beat" the middle of the tongue is raised, and the tongue is felt at once if the point of the finger is inserted into the mouth. In the case of the vowel in "boot" the back of the tongue is raised, and the whole tongue is retracted in the

[1] Sweet, *Primer of Phonetics*, Oxford, 1906[3], 3*s*. 6*d*.

mouth, so that we do not at once feel it on inserting the finger. To the vowel in "beat" we give the name *front*, the same name that we give to the consonants [ç] and [j]; for the vowel is closely related to these consonants; to the vowel in "boot" we give the name *back*, the same name that we give to [x], [k], [ɣ] and [ŋ]. The tongue in front vowels slopes to the back; the tongue in back vowels slopes to the front. Intermediate between these two types we have the *mixed* vowels, where neither the back nor the front articulation predominates, but where the tongue is raised or lowered as a whole. The mixed vowels are, therefore, flat-tongue vowels, and are different from the back and front types, which are sloping-tongue vowels.[1]

Tenseness or Slackness of the Tongue.—In the third place the tongue may be held in two different ways, tense and slack. A Scotchman will easily realise this by isolating his vowels in "beat" and "bit," an Englishman by comparing his pronunciation either with Scotch or French. (The Frenchman is always supposed to ask for a "leetle beet" instead of a "little bit.")

Rounding or Unrounding of the Lips.—Finally, if we take again the pair "beat" and "boot," and consider this time, not the movement of the tongue, but that of the lips, we shall see that, whereas in the vowel in "beat" the lips are gently parted and may be a little spread at the corners, the lips in pronouncing the vowel in "boot" are contracted at the corners of the mouth, and the whole mouth may be protruded. We call the vowel in "boot" a *rounded* vowel; the vowel in "beat" an *unrounded* vowel. Further, if an Englishman isolates the vowels in "boot" and in "not," he will find that the degree of contraction of the lips varies. Or if a Scotchman isolates the vowels in his pronunciation of "boot," "so," and "law," he will also find that his degree of contraction of the lips varies. The degree of contraction of the lips naturally depends upon the degree of the height of the tongue, for it would be contrary to the law of economy to narrow the passage in the mouth by raising the tongue and then let the sound escape freely through the lips. But the connection between the height of the tongue and the

[1] The best diagrams of tongue-positions are those in Grandgent's *German and English Sounds*, Ginn, 1892, *2s. 6d.*

contraction of the lips, though natural, is not necessary, and we find that some rounded vowels are pronounced with a greater degree of rounding than their tongue-height normally demands. These are said to be *over-rounded* vowels. Others again are pronounced with a less degree of rounding than one would expect from the height of their tongue-position. These are said to be *under-rounded.*

Vowel-analysis.—Combining now our various criteria preparatory to a full analysis of vowel-sounds, we have three positions in the vertical movement of the tongue, which when combined with the three positions in the horizontal movement of the tongue, give us nine primary types :

	Back.	*Mixed.*	*Front.*
High	1	4	7
Mid	2	5	8
Low	3	6	9

Each of these may be tense or slack (or narrow and wide, for the tensening of the tongue leads secondarily to the narrowing of the passage), which doubles the number of the types, and brings the total up to eighteen. Lastly, each of the eighteen may be rounded or unrounded, which makes our total now thirty-six. We could easily increase this total. Each of these vowels, for example, may be long or short, and between typical high and typical mid-front vowels there are other vowels : one exactly between high and mid, one a lowered form of high, one a raised form of mid, and so on for the other positions. Practically, however, it is better to deal with a limited number of types only. As Dr. Sweet says, in the Preface to his *Primer*, " The only sound basis of theoretical phonetics is a practical mastery of a limited number of sounds."

Use and Abuse of Key-words.—When dealing with the vowels the beginner must be on his guard in using the key-words given. In the case of the consonants there is but slight possibility of misunderstanding : an Englishman might mistake Scotch [ʍ], Sc. [ç], or Sc. [x], a person with [R] might imagine he possessed [r], but that is all. In the case of the vowels there is possibility of mistake with regard to almost every one. The

vowel-sounds vary in the different parts of the country; and not only are they different in themselves, but they are differently used. Two mistakes may be made: a wrong sound may be assumed throughout, or a right sound may be assumed in a wrong place. Key-words, according to some extremists, are of no use whatever. For, as they say, if the learner possesses the pronunciation meant to be indicated by the keyword, he can, by isolating it, at once arrive at the sound meant. On the other hand, if the learner does not know the pronunciation meant to be indicated by the key-word, it is scant comfort to him to know that the sound he is searching for is contained in this word, which he does not know how to pronounce. But yet we must work at first with key-words, for it would be unreasonable to ask the beginner to work by positions of vocal organs of which he is perfectly unconscious.

Front Vowels.—The front series of vowels is the easiest to begin with. High-front-narrow we find in Scotch "beat"; mid-front-narrow in Sc. "bait." Low-front-narrow is contained in Southern English "fair." High-front-wide is contained in "bit," mid-front-wide in "bet," low-front-wide in S. English "bat." But there are countless varieties in the sounds, and great differences in the distribution of them. We write the series [i], [e], [ɛ]; [I], [ę], [æ]. Scotch [I] is often found lowered, often tensened. Scotch [ę] is sometimes lowered, sometimes tensened (especially in Edinburgh). For [æ] Scotch speakers often substitute quite a different vowel—that in one variety of Southern English "*a*ther." In Edinburgh [æ] is often raised to [ę] by those who wish to speak "fine," so that "pat the cat" is undistinguishable from "pet the ket." What the beginner must do is to keep his ears open, find out his own tongue-positions, and compare them with normal. Whispering the vowels is also a help, for if we whisper the vowels we get rid of differences of pitch. The front vowels, when whispered, give a descending major third.

Back-rounded Vowels.—In the back-rounded series, high-back-narrow-rounded is found in Scotch "boot," mid in Sc. "so," low in "law." High-back-wide-rounded is found in Southern English "boot," mid in one variety of "not," low in

another variety of the same word. The symbols are [u], [o], [ɐ]; [U], [ɒ], [ɐ̈]. Scotch [u] is often very much advanced, Sc. [ɐ] unrounded. Scotch [ɒ] is sometimes tensened; sometimes quite a different vowel is substituted for it, so that "not" and "nut" sound the same.

Back-unrounded and Mixed Vowels.—[o] unrounded gives us [ʌ], the sound in one of the varieties of "but"; [ɒ] unrounded gives [a], one of the varieties of "father." [ɐ̈] unrounded gives [*a*], the other common variety of "father." Southern English contains two mixed vowels: low-mixed-narrow [ə :], as in bird, mid-mixed-wide [ə], as in the second vowel in "father." Scotch does not normally possess [ə :] at all, and mid-mixed-narrow is sometimes used for mid-mixed-wide. : is always used as the sign of length, and it distinguishes [ə :], which is always long, from [ə], which is always short.

The Diphthongs.—Both English and Scotch possess three types of diphthongs (that is, two vowel-sounds produced with the same breath-impulse, one of which is merged in the other)—the "fine" type, the "house" type, and the "boy" type. The "fine" type may begin with [æ] or [a], [*a*] or [ə], and end with [i], [I], [e], or [ɐ̨]. The "house" type may begin with [æ], [a], or [*a*], and end with [u], [U], or [o]. The "boy" type may begin with [ɒ] (which is sometimes more or less unrounded), and end with [i], [I], or [ɐ̨]. As a matter of practical convenience, seeing that none of these varieties carry with them any difference in meaning, the diphthongs are generally written [ai], [au], and [ɔi].

In addition to those three types, English possesses two diphthongs [ɐ̨ I] and [ɒ U], where Scotch uses plain vowels [e] and [o], as in "day" and "so," and Cockney substitutes [ai] and [au]; and where Scotch speakers pronounce the final [r] in words like fair [fe·r], dear [di : r], poor [pu·r], soar [so·r], English speakers pronounce [fɛə], [dIə], [pUə] (at least the older generation), [sɒə] (and also [sɒ]). But to give even a short survey of all the different possibilities would lead one too much into detail. The great point is that the learner should listen carefully, and then try to find organic reasons for the different effects produced upon his ear. If he hears a difference, there must be some reason for that difference, and it is his business to find it out—sometimes

a hard task, for differences in vowel-sounds may be due to many causes, and sometimes different causes produce much the same effect.

Table of Vowel-sounds in Southern English and Scotch.

	Back.	Mixed.	Front.	Back.	Mixed.	Front.	
High ..			i			I	Unrounded.
Mid ..	ʌ		e	a	ə	ɐ	
Low ..		ə:	ɛ	ɑ		æ	
High ..	u			U			Rounded.
Mid ..	o			ǫ			
Low ..	ɔ			ɔ̈			
	Narrow.			Wide.			

Common Mistakes to be Avoided.—The mistakes about the vowel-sounds to be avoided in school teaching are: talking about sounds in terms of letters, instead of in terms of sounds; and, secondly, mixing up sounds and letters. For example, teachers are sometimes heard to say that there is "a long 'i' in bite, a short 'i' in bit." Now the i in bite is a diphthong. Or they say that there is "a long o in note, a short o in not." Now the sound in note may be, and is in Scotch, long [o], but in English it is [ǫU], whereas in not we find [ǫ]. All these statements are statements about letters, not about sounds. Again, in such a word as "Cæsar," teachers sometimes talk of a-e diphthong. But there is no diphthong in Cæsar; there is only a ligature of two letters, or if the word is printed Caesar, there is a digraph.

A much more serious mistake is committed in the infant-room, if the children are permitted to isolate the sounds incorrectly. For example, in breaking up "cat" into its component sounds, the children will tell you that [k] [a] [t] makes [kæt], which is manifestly wrong. Or the mistake may take a different form, if the teacher speaks one dialect and the pupils another, and the class is being taught after a mixture of phonetic and alphabetic methods. For example, an English teacher says to a Scotch class: "If you add an e to 'car' you get 'care,'" which is spelling, not sounds. What the teacher says is [ka:] and [kɛə];

what the class echoes is : [ka·r] and [ke : r], for in Scotch the [r] is always given if r· is written, whereas in English it disappears except initially or before or between vowels. Or a class is drilled in the following way : a (aye) sounds ah in father, rather ; i (eye) sounds [I] in bit and sit. The plain answer to this is that [ai] sounds [ai], and [I] sounds [I], and cannot *sound* anything else. What the teacher means is obvious—namely that the *letter* i [ai] receives the value [I] in bit. The mistake is only another example of the hopeless confusion in some people's minds between sounds and the letters that represent them.

Double Forms.—At the present moment teachers impress upon their pupils the fact that "the" before a vowel sounds [ðiˈ], "the" before a consonant, including the aspirate, sounds [ðəˈ]. There is, as a matter of fact, a third emphatic pronunciation [ðiˈ :], as in "*the* book," but we may neglect this third form for a moment. The important point is that double forms of "the" are being taught in the schools. But "the" is not the only word which has two pronunciations for one spelling. If we pronounce such a phrase as "As I was walking along," and compare it with "Were you walking along ? Yes, I was," we can easily hear that "was" in the first example differs from "was" in the second. If we transcribe the first "was," as it occurs in the sentence, we must transcribe it as [wəz]. The other "was" must be transcribed [wɔ: z]. In the future, therefore, teachers will have to introduce the doctrine of strong and weak forms, as it is called, into their teaching. They have already done it for "the," hence the principle is granted ; it only remains to extend the application. Dr. Sweet, in his *Primer of Spoken English* (pp. 14–16), gives a long list of strong and weak forms. Some of these are recognized by the spelling (I am, and I'm) ; some, like "was" and "that," have one spelling form, but two pronunciations according as they are stressed or unstressed in the sentence. These points should be noted, as they come up either in the teaching of reading or in the grammar of the spoken mother-tongue.[1]

Relations of Vowels and Consonants.—Seeing that the presence or absence of audible friction is the criterion by which

[1] See Wyld, *Elementary Lessons in English Grammar*, Oxford, 1909, 2*s*.

we decide whether a sound is a consonant or a vowel, it is evident that certain vowels must be closely related to certain consonants. For example, take such a proper name as "Julia." Two pronunciations are current: [dʒU:ljə] and [dʒU:lIə]. In the first, the middle of the tongue is raised so high in the second last sound that consonantal friction is produced, while this is lacking in the second pronunciation. [w] is related to [u] in the same way, for in [w] we allow the friction of the outgoing breath to be heard upon the lips, at the same time keeping the tongue in the high-back position. What is generally done in teaching, when the consonantal sound is desired, is to tell the pupil to pronounce more quickly, and trust to the sound being thus consonantized; but it would be better to explain briefly the difference between vowel and consonant, for this difference is not one of speed in utterance, but of quality.

Breath-groups and Stress-groups.—There now remain several points of importance regarding the synthesis of sounds, which we shall endeavour to treat as briefly as possible, and draw from them the pædagogic consequences. In the first place we must get rid of the notion that, when we speak, we make little pauses between our words, just as the printer leaves little spaces of white paper. Two reasons make us pause—one physiological, the other psychological. We pause to renew the stock of air in our lungs, and we pause to ensure that the listener is following the sense of what we are saying; and to make this easy for him we group our words. All the speech-sounds we produce between one taking of breath and the next we call a breath-group. The end of the breath-group and the end of the sentence coincide, for after every sentence we breathe again. But, if the sentence is long, we may have to breathe twice or three times at convenient places. Hence Dr. Sweet's paradox that "every sentence is necessarily a breath-group, but every breath-group need not be a complete sentence." What the teacher must see to is that the pupil from the very first phrases his sentences, not reading them laboriously as an aggregate of single words, but dividing them intelligently. Insistence upon a good attitude and a few simple breathing exercises will help in this mechanical requirement of good reading.

Length of Vowels and Consonants.—With the distinction between long and short vowels we are theoretically all acquainted. "Full length may be heard in English stressed vowels when final, as in sea, and before voiced consonants, as in seize, half-length in stressed vowels before breath consonants, as in cease."[1] In Scotch full length is rare, and the difference between long and short vowels slight. But not only have we differences in the length of vowels; there are also differences in the length of consonants. "In English consonants are long after a stressed short vowel, as in hill, short after a stressed long vowel, as in heel. But in such cases the length is often distributed equally over vowel and consonant."[2] The application of this theory belongs to the modern language part of the article, for in French we find *short* final stressed vowels (cf. Fr. *oui* and Eng. we; Fr. *si* and Eng. sea), while in German we find *short* consonants after short stressed vowels (cf. Ger. *will* and Eng. will, or the typical German and the typical English pronunciation of Bonn).

Stress.—By stress we mean the force with which the breath is expelled from our lungs in producing any sound or group of sounds. In English this force rapidly diminishes, in German still more rapidly, while in French the force is nearly equal. Three factors seem to be important in stress, and they sometimes cross one another: traditional, logical, and rhythmical stress. "Inside" and "outside" are often pronounced with the accent on the "side"—traditional stress. Put the words in opposition to one another, and at once the traditional stress in shifted: *in*side and *out*side. This is logical stress. People who pronounce "illustrated" with the accent on the "ill" will sometimes shift the accent to the second syllable in "*The Illustrated London News*." This is rhythmic stress warring with traditional stress. Rhythmic stress is seen in its perfection in the reading of poetry by small children, and the reading of the first line of "Casabianca" as "The bóy stood *on* the búrning déck" is its classic expression. This tendency on the part of children to a rhythmic sing-song must of course be rigorously suppressed. If we read verse intelligently, the rhythm will take care of itself, always supposing that our poet has been careful to put a rhythm there! The

[1] Sweet, *Primer of Phonetics*. [2] *Ibid.*

degrees of stress, which are very numerous, are most neatly marked by figures if a finer discrimination is wanted (possible); practically the accent suffices. It will be found a help to whisper long words to determine the stress, or we may pronounce one portion of the word mentally, the other portion aloud.

Vowel Beginnings and Endings.—In the finer points of Phonetics with which we have now to deal, all depends upon the co-ordination of the different movements, upon the neatness with which the changes in position are carried out. The beginnings and endings of sounds we call their glides; the on-glide is the preparatory glide, the off-glide is the finishing glide of any particular sound. Vowels, for example, can be uttered in four different ways. The factors to be considered here are: (1) the flow of breath; (2) the action of the vocal cords; (3) the position of the stress; while for the moment we leave the mouth-modification out of account.

(*a*) The breath may escape a little before the cords have been put into position, the stress falling upon the vowel itself. This gives us the common gradual beginning.

(*b*) Instead of stressing the vowel, we may shift the stress to the preceding escape of breath. This gives us stressed gradual beginning, or the aspirate. Hence we see that the aspirate is more correctly looked upon as the beginning of a vowel in certain cases, than as a consonant having an independent life of its own.

(*c*) The emission of the breath and the closing of the cords may be simultaneous, the stress falling upon the vowel. This is the clear beginning which singers aim at, for from their point of view the escape of breath preceding gradual beginning is sheer waste, when it is not positively disagreeable. This beginning is generally called by them the "coup de glotte," or sometimes the "attack," which is an ambiguous term meaning sometimes individual attack, sometimes choral attack.

(*d*) The actual closing of the cords may be stressed, forming the consonant throat-stop-voiceless, with which we are already acquainted. Vowels are finished analogously, all the processes being reversed.

Throat-stop-voiceless is one of the sounds which hurt the

throat, just as coughing, which is a spasmodic succession of throat-stop-voiceless sounds (glottal stops), is not only a sign of irritation, but actually increases it. Many Scotch speakers use the glottal stop habitually for emphasis, and in North German it is found before all initial vowels and also after many German prefixes. The sound is condemned by all German elocutionists and teachers of singing as both disagreeable and tiring for the voice.

Glides of Unstopped Consonants.—The glides of the unstopped consonants are comparatively easy. The only possible difficulty occurs when we consider the exact moment at which the voicing begins and ends in the case of the voiced unstopped consonants. Take such a word as rising. Now, seeing that both the diphthong which precedes and the vowel which follows the [z] are voiced, [z] itself is fully voiced throughout. In other words, the throat movement producing voice and the mouth-position, blade-open, are perfectly co-ordinated. Suppose, however, the mouth-position is ready a moment before voice sets in, and that a little breath escapes. We shall then have a slight voiceless [s] preceding the voiced [z], or, in other words, [z] has a voiceless on-glide. This is the general way of beginning initial [z] in English. Suppose, again, that in final [z] the mouth-position, blade-open, is kept for a moment longer than the closed vibrating position of the cords, and that breath continues. Here we have the reverse of what happened before. [z] has following it a slight voiceless [s], or, in other words, [z] has a voiceless off-glide. This is a common way of finishing final [z] in English, but the other variety may be sometimes heard, where the [z] is fully voiced throughout, the mouth-movement and the throat-movement being made to co-ordinate perfectly. The difference between "gradual" [z], where the movements are not co-ordinated, and "clear" [z], where they are, may be best seen by comparing English and French. When we say Fr. *vive*, the Frenchman is apt to understand *vif*; on the other hand, the Frenchman's [v]'s and [z]'s sound overdone to our ear. Our plan is to start with our fully-voiced [z] in "rising," and try to transfer it to the beginning and the end of our French words.

Glides of Stopped Consonants.—The glides of the stopped

consonants are harder than those of the unstopped, and there is more possibility of variation. In the case of the voiceless stops, either there is no escape of breath between the loosening of the stop and the setting in of voice, or the escape of breath is heard more or less as a separate element. Scotch seems often to have a voiced glide after voiceless stops; English always a voiceless glide. Just as in the case of rising, there is no doubt about the full vocality of the medial voiced stops, as for example in digging. But if we take a final [ᵍ], as in dig, we shall find that voice is gone even before the closure is loosened; or if we take initial [ᵍ], as in get, the cords are closed, but no breath is driven in, so that our initial [ᵍ] is the nearest approach possible to voiceless stop plus voiced glide, as we find it in South German and in French. Hence our initial voiced stops form a stepping-stone to the French voiceless ones, for both have voiced glides, and our medial voiced stops form a stepping-stone to the French ones, initial and final as well, for they are fully voiced.

Glideless Combination.—In speech we take the shortest way between two following sounds, and so it sometimes happens that two sounds are joined without any intervening glide. Take such a word as bi*nd*. All we do in passing from [n] to [d] is to close the nose-passage. In fact, whenever the two consonants are alike in place and differ only in form, the transition from the one to the other is made without any glide. If the place of the one consonant is near the place of the other, they are sometimes made alike in place, and then the same rule holds. (For example, "tenth," where the [n] is sometimes made point-teeth to suit the following [θ].)

Development or Non-Development of Certain Sounds.—Sometimes, owing to the very quickness with which the movements of the vocal organs are carried out, it is difficult to tell whether a sound has been developed or not. Take the word "gli*mps*es." Some pronounce [m] [p] [s], others only [m] [s]. There are three changes made in passing from [m] to [s]: (1) we shut the nasal passage, (2) change from lip to blade, (3) open the vocal cords. Now suppose we shut the nasal passage and open the cords, but lag behind in changing from lip to blade, we then develop lip-stop-voiceless or [p]. Or take another example of

the same kind—the word fri*ng*es. Some pronounce [nd'ʲ], others [nʲ]. The changes in passing from [n] to [ʲ] are two in number: (1) we shut the nasal passage, (2) change from point to blade-point. If we close the nasal passage, but delay the mouth-change, we develop on our way from [n] to [ʲ] point-stop-voiced or [d]. Here again the development or non-development of sounds depends on the quickness and neatness with which we make the required changes.

The Syllable.—In pronouncing sounds we produce them with varying sonority. Whenever a sound is relatively louder than the one immediately preceding it, we have the impression of a new syllable being started. Hence if the second of two consonants is more sonorous than the first, the second consonant may form a whole syllable by itself, as in "ta*ckle*" [tækl̩]. This we indicate by ̩ below the consonant. On the other hand, in "*cl*othe," there is progressive diminution of sonority, except in the mispronunciation of the word, where [l] receives more sonority than [k], and where, therefore, the impression of a disyllable is produced. The two elements in a diphthong always differ in sonority, and double consonants (as in coat-tail) are recognized as such by the little break, and the crescendo upon the second part of the [t].

Intonation.—In speech we pronounce our sounds with varying pitch, some higher, others lower. The pitch varies according to our general state of health, or according to our emotions, and each one of us has a middle range of notes in the speaking-voice which we should use, so as to be able to ascend or descend as occasion requires. Excitement generally expresses itself in high tones, although hatred and contempt are often expressed in low, level tones. Besides this general average of pitch there are constant variations up and down. Our voice rises when the sense is incomplete, falls when the sense is complete; but this last statement is far from being universally true. In certain parts of the country the voice always rises, even at the end of a simple affirmation; and this gives the impression of indecision on the part of the speaker, which may not be at all borne out by facts. Teachers should command in falling tones, so as to give the contrary impression. Great individual differences exist with

regard to the variety of the tone used, and also with regard to the intervals between the highest tone in a single sentence and the lowest one. In singing we conceal the passage from one tone to another as much as possible, except in the device called the slur, which should, like all the other singing devices, be used but sparingly. In speech we are constantly gliding up and down, and only occasionally dwell upon a single note, or make a rapid rise or fall.

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III

THE TEACHING OF ENGLISH

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Diversity of Material Commonly Included.—Even a momentary consideration of the title of this article will suggest to the experienced teacher an array of studies and exercises which frequently appear in school time-tables and examination syllabuses, and which, it must be confessed, are not at first sight marked by unity of aim or harmony of conception. "English subjects" have in the past been held to include even history and geography, and though we put aside this legacy of the old classical curriculum, we are still left with reading, writing, composition, spelling, grammar, literature, recitation, dictation, transcription, parsing, analysis, paraphrasing, *précis*-writing, etymology, word-building, and so on. Such a list at once strikes one as dangerously chaotic, representing conditions in which both teacher and scholar are prevented from "seeing the wood for the trees." Manifestly we need a guiding principle, the application of which will enable us to put these various items into their right places, and to give each of them its due weight and no more. In other words, we need a clear and definite statement as to our aim in giving lessons on the mother-tongue.

Relation between Teaching of Language and of Literature.—Our first step towards clear definition will be to consider the distinction and the connection between the teaching of language and the teaching of literature. The first of these is related to the second as teaching a child to draw or to sing is related to leading him to appreciate some of the simpler masterpieces of art or music respectively. In the one case he is learning to express himself; in the other case he is learning to understand and admire

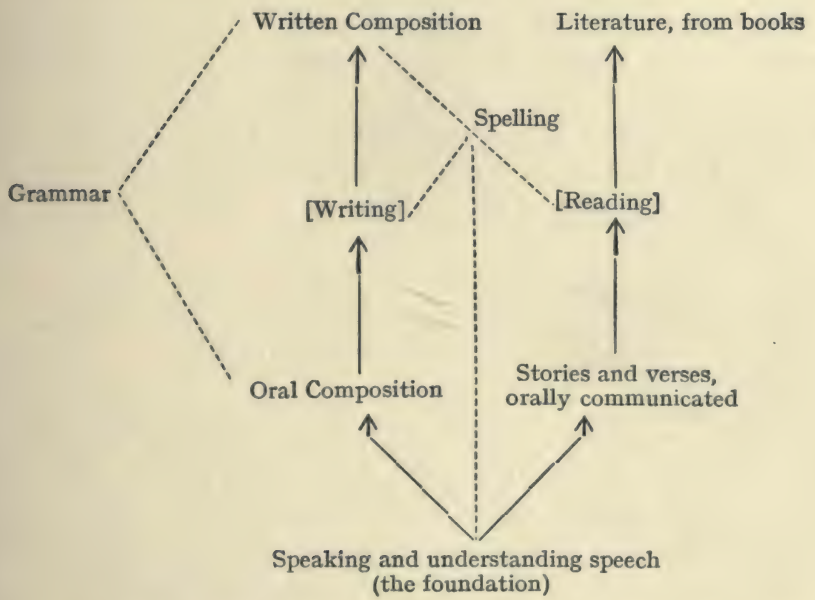
the way in which the giants of his race have expressed themselves. The distinction between the two is obvious enough; and the connection is equally to be insisted upon. But we must be careful how far we press this connection. The effect of the study of literature upon the use of language is plainly an affair of imitation. Now, there are two sorts of imitation: that which is spontaneous and that which is deliberate or intentional. When a person expresses himself in language, his mode of doing so, his choice of words, and the construction and balance of his sentences must depend in great measure upon the sort of literary company he has kept. The process of spontaneous imitation is here an indisputable psychological fact. But to say that the study of literature should influence the use of language through deliberate imitation of any author or authors, however great, is a widely different matter. Whatever else a schoolboy's "composition" or a student's essay may be, it should be the natural expression of his thoughts. To produce a paragraph or two in conscious imitation of a certain author's style may be very good as an occasional exercise of one's ingenuity; it is certainly dangerous as a common educational expedient. We conclude, then, that the close connection sometimes vaguely asserted between the teaching of language and the teaching of literature is either a truism or a blunder. The two will necessarily be correlated, but nothing can be gained by trying to mingle them into one course of lessons. In the present article we shall, whilst presupposing that an eye is kept upon the child's concurrent advance in knowledge of literature and other subjects, occupy ourselves mainly with the problem of training him in the use of language for the expression of his own thoughts and feelings.

Aim of Language Teaching.—In the preceding remarks we have been compelled to anticipate somewhat the question as to our aims in teaching English, but this point now calls for further notice. Language enables us to express our own thoughts, and to understand the thoughts of others. To this statement we must not forget to add that the very attempt at intelligible expression reacts upon the process of thought itself. Without entering fully upon the subject of the relation between thought and language, we may point out

that whilst on the one hand it is doubtless true that "orderly thinking is the very basis of style," it is no less true that "a difficulty in thought clearly expressed is often half solved." Hence we may say that the aims of English teaching are (1) training the pupil to express his own thoughts, whether orally or in writing; (2) training him to comprehend the thoughts of others, whether expressed orally or on paper; and (3) in so doing, training him to think clearly about the subject occupying his attention. In a general way these aims, and especially the second and third, are prominent in the teaching of various branches of the curriculum. It is the first of these aims that is specially characteristic of English lessons, the object of which may therefore be stated as *an explicit training in the practical use of the English language as a means of self-expression*. At first sight the statement may seem too narrow. What place, it may be asked, for example, is here left for grammar? To this point we shall recur presently. Meantime let us agree upon the above definition provisionally. Let us agree, that is to say, that the teaching of language is identical with the teaching of composition, it being understood that whatever grammatical and verbal study can be shown to aid the pupil in expressing his ideas must find a place in the course.

Relations between Parts of English Course.—In the light of our definition we may at any rate show at once how the various items of the course stand related to one another. In the first place let us remind ourselves of the fact, so obvious as to be frequently overlooked, that whatever we may try to teach the small child when he comes to school must be based upon what he has acquired beforehand. We are indeed engaged in teaching him the *mother*-tongue. It is their power of speaking and understanding speech, and that power alone, which the teacher of young children can reckon upon as the foundation of English teaching. Starting from this point, the Kindergarten teacher proceeds to get the children to express their thoughts orally—*i.e.* she begins to train them in the use of language; and concurrently she tells them stories and gets them to recite verses —*i.e.* she begins their literary training. After a time the children must begin learning to read and to write, and the acquisition of

these arts will take up a large space during a certain period in the child's education. This must not, however, blind us to the fact that they are essentially instrumental arts. They are not ends in themselves. Their purpose is simply that of extending the pupil's range of communication. They modify, but do not in principle alter, the problem of language-teaching. They appear in the course merely as important incidents. Having acquired them, the child can express himself on paper, as well as orally; and he can, instead of being beholden to the teacher, get the pretty stories and verses out of the book for himself. Spelling is acquired in connection with speaking, reading, and writing, whilst grammar and word-study are pursued only so far as they help towards correct composition. The results may be tabulated thus:



Into the details of language-teaching before the child is able to read and write, we do not here enter, because they are more appropriately dealt with in the article devoted to the subject of the Kindergarten. Also, the acquisition of the instrumental arts of reading and writing is too specialised a topic to be dealt with in the course of this article, and is therefore provided for

elsewhere. We shall here assume that this preliminary stage is passed.

Place of Grammar.—It will be well in the first place to consider to what extent grammar should be included in a course of English instruction. In the past it has been customary, even in the elementary school, to teach a formal and systematic outline of grammar, partly on the ground of its practical bearing upon the speaking and writing of English, and partly—perhaps chiefly—on the ground that it affords a mental discipline of a high order. The latter argument has been generally abandoned, not only in the field of language, but also in that of mathematics and science, and it is now increasingly held that, unless the requirements of school and of life are to fall apart, we must teach that which is practically useful for the conduct of life, taking care so to teach it as to extract from it the mental discipline upon which the older educators rightly laid stress. Practical utility, then, for the purpose of speaking and writing English, is the test to be applied to every item of grammatical lore before we can admit it into the ordinary school course, and it will be worth while registering some of the probable results of applying this test to the grammatical topics usually taught.

TEST OF PRACTICAL UTILITY APPLIED TO GRAMMATICAL TOPICS

Topic.	Should it be Taught ?	Reason for Decision.
Analysis of sentences.	Yes.	Bears upon sentence-construction, and useful in elucidating difficult passages in literature. Should be supplemented by exercises in synthesis of clauses, the substitution of clauses for words and phrases, supplying omitted clauses, etc.
" Parts of speech."	Yes.	Supplies terminology for discussion of errors in use of English. (*Functions* of words to be constantly emphasised.)
Nouns : proper and common.	Yes.	Bears upon use of capital letters.
Nouns : abstract and concrete.	No.	Errors in use of language do not commonly arise through ignorance of this distinction. Besides, it is too difficult.
Gender of nouns.	No.	Exists only to slight extent in English. No question of concord arises as in Latin. Words denoting masculine and feminine simply a question of vocabulary.

TEST OF PRACTICAL UTILITY APPLIED TO GRAMMATICAL TOPICS (*continued*)

Topic.	Should it be Taught?	Reason for Decision.
Number of nouns.	Yes.	Errors in writing of plurals, and in concord of subject and predicate are common.
Case of nouns.	No.	No inflection except Possessive, which can be taught simply as possessive form of noun.
Classification of adjectives and adverbs.	No.	Not *necessary*, but not difficult, and perhaps might usefully be taught in simplified form.
Comparison of adjectives and adverbs.	Yes.	Errors frequent in use of comparative and superlative forms, and after word "than."
Pronouns: classification.	To some extent.	Exhaustive classification unnecessary. "Personal" and "relative" pronouns to be distinguished. The latter better called the "joining" pronoun.
Person of pronouns.	Yes.	Not difficult, and useful in connection (*e.g.*) with forms like "You and I," "He and I."
Number of pronouns.	Yes.	Distinctions learnt in connection with nouns easily transferred to pronouns, and for same reason.
Gender of pronouns.	No.	Unnecessary unless local errors are prevalent in use of *he*, *she*, *it*, etc.
Case of pronouns.	No.	Terms "case," "nominative," superfluous. Enough to teach that certain pronouns (he, she, they, etc.) stand in subject, and certain others (him, her, them, etc.) in object and after prepositions.
Verbs: transitive and intransitive.	Yes.	An important distinction, easily connected with analysis of simple sentence.
Verbs: strong and weak.	No.	No practical bearing. Correct forms of past tense, etc., can be learnt only by practice.
Voice of verbs.	No.	Unnecessary to use terms "active" and "passive," but useful exercises in changing sentences, making the old object the new subject, can be devised.
Mood of verbs.	No.	A difficult idea. Most definitions in the books are wrong. Subjunctive disappearing from modern English. Imperative and infinitive forms can be simply so called.
Tenses of verbs.	Yes.	Important because of liability of children to go wrong in using them, especially in dependent clauses.
Prepositions and conjunctions: classification.	No.	No immediate practical value.
Exercises in parsing.	To some extent.	Useful as occasional *test* of grammatical knowledge, but easily overdone.

Some of the negative decisions recorded above might well be modified in the case of children learning another language. The point is that a useless array of grammatical terms should by all

means be avoided, especially in teaching children under twelve years of age. With older children, a term's work in formal, systematic grammar, shorn of inessentials, might prove valuable, but the time has gone by when grammar was the chief stock-in-trade of the English teacher. English grammar should be taught only so far as it is a help in the practical use of English as an instrument of expression, or in the acquisition of some other language than English.

The Grammar Lesson.—But even when we have thus limited the amount of grammar which it seems worth while teaching, we must teach judiciously if the grammar lesson is to be anything but a most barren occupation. A rule of grammar must be strictly viewed as a record of what linguistic usage *is*, or rather of what it *has come to be*, not of what it *shall be*; and a lesson in grammar should therefore be an inquiry, undertaken by teacher and pupils jointly, and conducted with a view to registering current usage as simply and accurately as possible. Consider, for example, the following treatment of the ordinary rules for the formation of the plural of nouns :—

Step 1.—A list of nouns is suggested by the pupils and written on the board: e.g. *cow*, *ship*, *child*, *mouse*, *bridge*, etc.

Step 2.—The children are asked to *say* the words used when more than one of the things is meant: *cows*, *ships*, etc. These words are not yet written.

Step 3.—The teacher, having struck out such words as *mouse* and *child*, with a promise that they shall be examined later, asks the children to say what sound we add to each of the other words in order to make the plural. The sounds in various cases are *-z*, *-s*, *-iz*. These representations need not be written. (So far we have the facts of the living, spoken language before us, as distinguished from the written forms, which are an afterthought, an affair of spelling.)

Step 4.—The children are asked to find out the reasons for variations. Try to pronounce dog-*s*, cat-*z*, kiss-*s*, etc. It is all a matter of speech, of producing sounds.

Step 5.—Now write down the plurals: *cows*, *ships*, *bridges*, etc. Can we make a rule? Add *-s* (pronounced sometimes as *s*

and sometimes as *z*), or, when *-s* by itself would make an awkward hissing or buzzing, add *-es* (pronounced *-iz*).

Step 6.—That is quite right. But I may tell you that this way of forming the plural is a relic of one of the ways in which our Saxon forefathers did so. They added *-as*, and this rule has been gradually altered. So that it is better to say that we add *-es* to form the plural, but shorten it to *-s* whenever the pronunciation allows us to do so.

Step 7.—Varied exercises follow.

The above example (which of course is not fully worked out) illustrates not only the general method of the grammar lesson, but also the advisability of using good text-books, especially if the teacher happens not to be acquainted with the older forms of the language. Step 6, for instance, is really a valuable bit of grammar teaching, but only a scientific grammarian like Mason is careful to point out the fact in question.

Exercises Necessary at Every Step.—Exercises, especially in the formation of sentences, and in the correction of badly arranged or syntactically faulty sentences, should accompany the teaching of grammar at every step. Much instruction, not the less effective because it yields some fun, can be got from the rectification of such sentences as "He hit a boy with a stone on his nose," and "If fresh milk does not agree with a child, boil it." Besides these blunders of the kind to which we are all liable, there are those to which the children in any given district are peculiarly liable, at least the children from homes where English is not well spoken. Of such mistakes the teacher ought to compile his own list, and upon this list he should base special exercises.

The Study of Words.—There is one part of grammar not included above which deserves a passing notice—the derivation of words. There doubtless comes a time in the history of an intelligent child when the individual word acquires an interest of its own. In particular what Trench called the fossil history and fossil poetry that often lie embedded in words may fascinate the child. He is sometimes known, indeed, to make extremely bold excursions into this sphere of knowledge: witness, for instance, the boy who defined a coolie

as a man who lives in a cool country, an archangel as an angel that came out of the ark, and an anchorite as a good man who anchored himself in one place. Something important is surely lost if we furnish no guidance whatever to this impulse towards tracing words to their sources, and if we neglect to brighten up a few of the faded metaphors of which our stock of words so largely consists. This feeling for words as such is entirely worthy of cultivation, for it may well lead on to a due respect for words, and a proper sensitiveness to their right use. But how is this feeling to be cultivated? Certainly not by presenting to the child dull lists of alphabetically arranged "roots" and "derivatives." A suggestive beginning might be made with local place-names, the names of the days of the week and months of the year, and such obviously interesting derivatives as *daisy*, *calico*, *meander*, *sardine*, etc. We might then proceed to the analysis of selected words such as *unselfishness*, *mistrustfully*, *hatred*, *darling*, bringing out the force of the prefixes and suffixes, and eliciting other instances. Modifying syllables might then be added to such words as *firm*, *honour*, *solid*, *light*, etc., the modification of meaning being at the same time noticed. A word like *describe* or *compose* might be introduced and the various changes of meaning that result from changing the prefix (*transcribe*, *circumscribe*, *depose*, *expose*, etc.) might be observed. The distinction of synonyms (e.g. *work*, *labour*, *toil*, *drudgery*) will furnish an interesting and instructive occupation, provided it be not carried too far, and provided it be accompanied by sentence-construction at every step. This kind of exercise tends to be carried to excess when words are introduced which lie beyond the range of the children's ordinary vocabularies.

Composition.—We have thought it best to deal with grammar separately and perhaps somewhat lengthily, not because it is to be treated as a separate study for school purposes, but in order to maintain the position we have taken up regarding its place in the curriculum. Such work as we have described should go on *pari passu* with the teaching of composition. The latter is really the heart of the subject, and to that we now turn. After the general explanations already given, it will probably be best to proceed

at once to pass in review the chief forms of composition exercise to which the school teacher may have resort, and to adjudge the educational worth of each of them.

Oral Exercises.—In the junior classes, even after the Kindergarten and transition stages have been passed, but before the children are able to write freely and spell correctly, oral composition should regularly be practised. As this kind of work is often a source of anxiety to teachers of Standards I.–III. in the elementary schools, and to teachers of young children elsewhere, we subjoin a few definite suggestions of plans which have been tried with success.[1]

(1) Individual children tell in their own words a story that they know. Sometimes the same child tells the whole story, and sometimes several children contribute. The rest of the children are encouraged to supply omissions and correct mistakes.

(2) A series of questions is written on the board, the answers to which form a continuous exercise in composition.

(3) A picture is placed before the class, a few minutes are allowed for silent preparation, and different children then give descriptions of the picture.

(4) A picture may also be used imaginatively: *e.g.* the children may be required to report the conversation of two or more people in the picture, or to tell the story which the picture suggests to them.

(5) A child is called to the front of the class, is given a picture of a familiar object or scene, and is required to describe the picture so well that the rest of the class are able to recognise the object or scene—an exercise which needs to be skilfully managed in order to answer its purpose. This exercise can also be carried out without pictures.

(6) The children describe the route—a familiar one—from one place to another, as they would describe it to a person asking the way; or they describe the way in which they do a certain thing.

A resourceful teacher will, of course, be able to add indefinitely to the above list, which is intended to be merely suggestive.

The Spelling Difficulty.—So much for oral composition. But should the efforts, even of little boys and girls, be

[1] By Miss N. Catty, M.A., who has helped me at this point.

confined to oral work? Should they not be allowed, occasionally at least, to write their compositions, notwithstanding the fact that the oral vocabulary of a child usually far outruns his ability to spell? Many teachers would answer this question in the negative, on the ground that the wrong form is fatally impressed on the child's memory every time he writes a word wrongly. There are strong reasons for believing that this conclusion is not warranted by a careful scrutiny of the facts. This point may be illustrated by the following example. A little girl of eight, well known to the present writer, wrote an account of Joan of Arc. The exercise was put away in a drawer and forgotten both by the child and by her parents; but about a year later it was found, and, without being shown to the child, was dictated to her. In judging the results of this experiment the reader should bear in mind (1) that the child had never seen the exercise between the two occasions mentioned, and had in fact completely forgotten it, and (2) that she had been led to give only the most ordinary attention to spelling during the interval, but had had ample practice in reading and writing, and, needless to say, speaking. The results were as follows :—

A.

(At 8 years of age)

Well to begein with the Eiechah were fighting againsed the French when Joan of art hard of this she was very sorry but she said what good would I do a poor girl like me but she had a dream and in the dream there came an angile and the angile said you must go and help the French.

When Joan woake up and told the peopel what she was going to do the peopel laft at her but she said am going and so she went and when she got to the french King she boud and said I your maggasty have come to help you with your men but he

B.

(At 9 years of age)

Well to begin with the English were fighting against the French. When Joan of Ark heard of this she was very sorry, but she said, 'What good would I do a poor girl like me!' But she had a dream and in the dream there came an angle, and the angle said, 'You must go and help the French.'

When Joan woke up and toled the people what she was going to do the people laughed at her, but she said '[I] am going.' So she went, and when she got to the French King she bowed and said, 'I your magesty have come to help you with your men.' But he

was a bit doufeul well they
put her at the haad of an
armera on a big war horse &
they cheird and tooke of there
capes and choke theme they
one in the Battell and then
Joan of arc arcked the King to
let her go home becorse she new
her brothers and sisters would
like to see her but he would
not let her go he said he wanted
her for other Batils.

befor long the French and
Englach had another Batil and
this time the Englach one and
what was the worst the Englach
took Joan of arc presner and
after a few day they treid her
and treid to make her say she
had been wicked but she
dinedied she had not but
they would not beleave her
and very very very *very*
sod to say they birend her
and even the poor men
were moved to tires and one
of them gave her a little
crose and her last word
was Jesses I am shoked
at my one people.

was a bit doutful. Well they
put her at the head of an
army on a big war horse, and
they cheared and took off their
caps and shook them. They
won in the battle and then
Joan of Ark asked the King to
let her go home, because she knew
her brothers and sisters would
like to see her. But he would
not let her go, he said he wanted
her for other battles.

Before long the French and
English had another battle, and
this time the English won, and
what was the worst, the English
took Joan of Ark prisoner, and
after a few days they tried her
and tried to make her say she
had been wicked, but she
dennied [it] but
they would not belive her
and very very very *very*
sad to say they burnt her.
And even the poor men
were moved to tears and one
of them gave her a little
cross and her last word
was Jeuses, I am shocked
at my own people.

It will be found that the number of mistakes in spelling fell from 42 to 9. This particular case suggests what we believe to be generally true, that spelling depends more upon auditory and motor memory, and less upon visual memory, than teachers have commonly supposed, and that, provided reasonable attention is being given to spelling, we need not debar the child from the freest expression of his thoughts upon paper. This is an extremely important matter, because it is quite certain that only in their written efforts do children throw off their reserve, and express their inmost thoughts and feelings. The same result cannot be obtained by practice in oral composition. The writer has seen many admirable little compositions written by

children which it would have been an act of sacrilege to read out to the whole class, so obviously and touchingly were they intended for the teacher's eye alone.

Written Exercises. (1) **Letter-Writing.**—Coming now to written work, we may instance letter-writing as an excellent form of exercise, suitable at all stages after the first. We distinguish the familiar, the friendly, and the formal business letter, the first being the only suitable form for young children, and the last being appropriate only to older children. Good results may be obtained by causing the children to write real letters to other children in the school; or the imaginary circumstances under which the letter is written may be agreed upon. In either case the children should be trained in the writing of address and date, the mode of salutation, the mode of ending the letter, and the addressing of the envelope, slips of paper being used for practice on the last point. The familiar or friendly letter lends itself to freedom and naturalness of expression, and is thus a good connecting link between oral and written work. Matthew Arnold quotes as an awful warning a letter written, probably with liberal help from a foolish teacher, by a private schoolboy to his parents. The letter begins thus: "The anticipation of our Christmas vacation abounds in peculiar delights," and ends thus: "We break up on Thursday the 11th instant, and my impatience of the short delay will assure my dear parents of the filial sentiments of theirs very sincerely." There is hardly any need to warn a modern teacher against tolerating such ridiculous pomposity; but we do need to train our pupils to discriminate between the easy personal style of the letter and the measured expression proper to the essay.

(2) **Reproduction of a Story.**—In former years the only kind of composition exercise encouraged in English elementary schools was the reproduction of a story read to the class, this being the only sort of test applied at the annual examination. Numerous books of stories were published as aids to the teachers, and some of these books were certainly fairly diverting as collections of jokes. Indeed the chief argument in favour of this method of teaching composition was the practice it gave children in seeing the point of a story.

The great disadvantage was that the child was always an imitator, never an originator. He was never called upon to express his own ideas—at least until he reached the highest class in the school. The reproduction of a narrative is no doubt good as an occasional exercise, but even then we should remember that some time should elapse between the hearing and the writing of the story, and that the teacher should tell the story rather than read it, because the children are less likely to transfer to their papers the *ipsissima verba* of a colloquial than of a literary narrative.

(3) **Construction of a Story.**—But a much more effective way of raising the composition exercise from the merely imitative level, and of offering direct scope for whatever originality the pupil may possess, is to require him to construct his own story, on the basis of a few suggestions from the teacher. A bare and general outline may be given, resembling the preliminary pencil sketch of a work of art, and the pupil may be required to supply colour and detail from his own imagination. By this plan children who possess any literary gift will speedily be discovered, and will have an excellent opportunity of cultivating their gift, whilst the others will at any rate have a substantial piece of work to do, involving something more than an effort of memory. And the process of public criticism which might follow in the next lesson would have its interest heightened by the fact that, notwithstanding generic similarity, there would be as many different stories as there are members of the class.[1]

(4) **Exercises in Description, etc., preceded by a Talk, and by Discussion of Outlines.**—As a step towards the unaided writing of the species of composition known as the essay, exercises in description, preceded by liberal help from the teacher, may next be noted. Description is in one sense more difficult than narration, because in the former the question of sequence requires careful forethought, whereas in the latter it largely settles itself when the subject has been agreed upon. The object or scene or picture to be described

[1] For detailed suggestions on this form of exercise, see P. J. Hartog's *Writing of English*, Chap. IV. and Appendix.

should of course be sufficiently familiar to the children. The teacher should get the children to express their ideas about it, and these might be jotted down upon the blackboard in the order in which they are given. If, for example, the object to be described is a cat, different children might contribute remarks about the animal's eyes, its tail, its prey, its whiskers, its coat, its claws, its fondness of the house, its dislike of water, its nocturnal habits, and so on. The teacher will then point out how necessary it is to put these things into good order, instead of writing at random, and by means of questions he will get the children to determine such an order, *e.g.* by bringing together the correlative facts of structure and habits. The points will then be rewritten on the board in the revised order, and the children will have had a good lesson in one of the essentials of composition before they begin to write. It will be seen that this kind of practice in evolving order out of chaos is possible even in the early stages. The use of books of ready-made outlines cannot be too strongly condemned. The children should be trained to make their own outlines, at first with a good deal of help, but afterwards with little or none. Some writers attempt to justify the use of such books on the principle "one thing at a time"—the separate "things" in question being thought and expression. But thought cannot thus be separated from its expression without ruinous effects upon both.

(5) **The Essay.**—Under a system of tuition like that described above, boys and girls in the two highest classes of the elementary school, and those of corresponding age in the secondary school, should have reached the point of being able to set forth in an orderly manner their thoughts upon a given theme. The independently written essay is not, indeed, to be entirely avoided in the earlier stages, but now it assumes a dominant place in the teaching of English.

Selection of Subjects.—The chief thing to be remembered is that children must *have* ideas if they are to express them, and that the selection of subjects is therefore a matter of first importance. The folly of setting children to write upon abstract and unfamiliar themes has often been exposed both by argument and by ridicule. As a specimen of the latter mode of attack,

the trials of one of Miss Kate Douglas Wiggin's heroines at the hands of a well-meaning governess are worth quoting :

" Rebecca made a poor hand at composition writing at this time. Miss Dearborn gave her every sort of subject that she had ever been given herself : ' Cloud Pictures,' ' Abraham Lincoln,' ' Nature,' ' Philanthropy,' ' Slavery,' ' Intemperance,' ' Joy and Duty,' ' Solitude ' ; but with none of them did Rebecca seem to grapple satisfactorily.

" ' Write as you would talk, Rebecca,' insisted poor Miss Dearborn, who secretly knew that she could never manage a good composition herself.

" ' But gracious me, Miss Dearborn ! I don't talk about Nature and Slavery. I can't write unless I have something to say, can I ? '

" ' That is not what compositions are for,' returned Miss Dearborn dolefully, ' to make you have things to say. Now, in your last one, on Solitude, you haven't said anything very interesting.'

" ' I don't know any more about Joy and Duty this week than I knew about Solitude last week,' grumbled Rebecca." [1]

Who will not admit that Rebecca's grumble is amply justifiable ? The pupil's effort at composition should not resolve itself into a wild search for ideas that will not come, but should be an attempt to arrange and express ideas that are there awaiting expression. We must, it is true, distinguish between ignorance and unreadiness ; for the former the only remedy is knowledge, whilst preparation and discussion meet the latter case. It is an excellent plan, for example, to select a subject for older pupils which is not an easy one, and to give a few days' notice, so as to allow time for preparation ; in this way parents and friends are often with good results drawn into the discussion of what is going on at school. Examples of the easier and more usual kind of subject are : a picture placed before the class, a picture which has often been seen but is not in the room, accounts of previous lessons, accounts of out-of-school experiences, pieces of imaginative writing, such as the story of a penny or of a worn-out football as told by itself. Examples of subjects requiring reflection and discussion are : Town and Country Life Compared, Why

[1] *Rebecca of Sunnybrook Farm.*

should we learn Geography? An Imaginary Conversation between two selected characters; and so on.

Matter and Form.—All that can be said about an essay may be comprised under the two categories of Matter and Form. These may be regarded from our present point of view as of equal importance, for good material badly put together may be almost unintelligible, whilst poor material well put together is an empty thing. Matter is cared for by providing suitable subjects and giving suitable help. Form is cared for chiefly by training the pupil to think over the subject carefully before beginning to write, and to make a scheme or outline for guidance in the actual writing. It is said that in English secondary schools form is little heeded in comparison with matter, whilst in German secondary schools matter counts for little as compared with form, the composition exercise being regarded as "a sort of logic," and the opinion being held that "original thoughts, a point of view properly his own, are not to be looked for," even from a senior pupil.[1] The difference is characteristic, and to some extent, no doubt, inevitable, for no English schoolmaster would tolerate this opinion. Still, there is no reason why either Matter or Form should be neglected.

Paraphrasing.—There remain to be considered certain other kinds of exercise in the use of English, more or less like those already described, but fairly distinct in the minds of teachers. First among these we note paraphrasing, an exercise akin to the reproduction of stories, but having a wider reference. The practice of examiners, and therefore of teachers, has been to require a paraphrase of any passage selected from a prescribed work of literature. The practice has been defended partly on the ground that it promotes the study of literature by causing the pupil to think carefully over the passage, so as to get at its real meaning. But this argument properly applies only to passages which present a real difficulty, and if such passages are long or frequent, the just inference is that the book is on the whole too difficult. A

[1] See Dale's paper on "The Teaching of the Mother-tongue in Germany," in *Special Reports*, vol. i.

pupil learning *Macbeth* may well be called upon to paraphrase such passages as "If it were done when 'tis done, then 'twere well it were done quickly"; "O relation, too nice and yet too true"; "The attempt and not the deed confounds us." But to spend time in paraphrasing long passages of the play, when the general meaning is clear, is an entirely different matter. This brings us to the second possible ground of justification. Are such exercises defensible on the plea that they give practice in English composition? Perhaps the force of this argument is best estimated by means of an example. Milton's lines,

> "What in me is dark
> Illumine; what is low raise and support,
> That to the height of this great argument
> I may assert Eternal Providence,
> And justify the ways of God to men,"

are thus rendered by the late Sir J. Fitch:[1]

"In so far as I am ignorant, enlighten me; when my thoughts are mean or poor, elevate and sustain them; so that I may be enabled to utter words not unworthy of my lofty theme, to speak rightly of the Divine government, and to vindicate the dealings of God with mankind."

Now, even supposing that an ordinary senior pupil could write as good a paraphrase as this, where is the gain? Practice in English composition can readily be obtained without resort to a method which, whilst it makes nothing clearer, constitutes a sad maltreatment of the original passage. The following instance, taken from an otherwise sensible little book on the teaching of composition, exemplifies the lengths to which some teachers are prepared to go, for unfortunately the humour appears to be unconscious:

"It was Christmas-time, and a mince-pie had been given to young John Horner. He sat in a corner of the room eating it, when suddenly, inserting his thumb and forefinger, he triumphantly drew forth a raisin, at the same time remarking that he was a very good little fellow."

[1] *Lectures on Teaching*, p. 278.

Writing in Prose Order.—Our conclusion is, then, that a close paraphrase of a long passage is not, as a rule, a desirable sort of exercise. This conclusion has no reference, of course, to the useful and necessary practice of disentangling the phrases of a difficult passage of poetry, and putting them into prose order for the sake of making them quite clear. It will be found, for instance, that the three stanzas of Gray's *Elegy* beginning "Th' applause of list'ning senates to command," constitute a series of clauses whose common subject occurs in the first line of the second stanza. In such a case it is highly necessary, in order to make sure that the sense is clear, that the clauses should be placed in prose order by the pupils, but as the *words* need not be materially changed, the result is very different from a paraphrase.

Oral Paraphrasing.—Further, our remarks about paraphrasing do not apply to the practice of giving the story, or getting the pupils to give the story which may be contained in a poem—such a poem, let us say, as Tennyson's *Lady Clare*. An oral paraphrase, taking quite a free and general form, and made without any attempt at finding equivalent phrases all through, may be extremely helpful.

Dictation and Transcription.—A few words may be added upon the time-honoured practice of dictating passages of English to be written down by the pupils. If the aims and methods of English teaching which we have explained are sound, it is difficult to see that the dictation exercise can have a position of importance in any well-conceived scheme of instruction. It cannot even be said that the exercise has any special connection with the acquirement of correct spelling, for dictation is rather a test of what the child has already learnt than a means of teaching him what he has not learnt. As a means of improvement in spelling, careful transcription, duly supervised, is superior to writing from dictation. If the dictation exercise is to survive, we should at least see that the child has had a fair chance of mastering the spelling of all the words, and we should then dictate the passage as far as possible in whole clauses, not in single words or in short meaningless phrases. Something then might be said for the mental exercise involved

in carrying the whole clause in mind whilst it is being written. In reality, however, "dictation" has very trifling value as a school lesson. It has been used as a convenient instrument for examination purposes, and has so found its way to a regular place in elementary school curricula—a clear instance of the way in which in educational concerns the tail too often wags the dog.

Conclusion.—We have now considered the different kinds of exercise which experience has shown to be most effective for the purpose of carrying out the aims explained at the beginning of this article. How far these aims are justified it is now for the reader to decide. The whole tendency of modern reform is towards making school instruction less academic and more practical, and it is in accordance with that tendency that the above recommendations have been made.

NOTE ON TEXT-BOOKS

It may be useful to add a few references to books in which the teacher may pursue further the subject of this article. Of general works on the teaching of English, intended for the teacher's use, the number is not large. Among them are

WILSON: *Lingua Materna.*
CARPENTER, BAKER, and SCOTT: *Teaching of English.*
P. CHUBB: *Teaching of English.*
HARTOG: *Writing of English.*
LAURIE: *Language and the Linguistic Method.*
The Report of a Conference on the Teaching of English in London Elementary Schools.
DALE: *Teaching of the Mother-tongue in Germany* in *Special Reports,* vol. i.

Good specimens of practical books for the pupil's use are

ARNOLD and KITTREDGE: *The Mother-tongue,* Part i. (adapted for use in English schools by Prof. Adamson).
HYDE: *Lessons in English.*
ARNOLD: *English Lessons.*

Among the best English grammars are those of

MASON.
WEST.
NESFIELD,
WYLD.
SALMON.

For help in the more advanced teaching of composition, recourse may be had to

ABBOTT: *How to Write Clearly.*
FOWLER: *Essay Writing.*

GEOGRAPHY ROOM: ST. DUNSTAN'S COLLEGE, CATFORD, S.E.

IV

GEOGRAPHY

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I. Introduction

There are many definitions of the scope of the Science of Geography, but it is best for the schoolmaster to regard it as that branch of science which describes and explains the Earth as the Home of Man. For school purposes it is not necessary to limit its scope unduly, and a good teacher will deal with the way in which man is suited to, or makes use of, his environment as much as with the environment itself.

There is one great change in outlook which has transformed geography from a purely informational subject into one of great intellectual and ethical value. Geography is not now regarded as merely a matter of knowing the names and whereabouts of places, nor even of knowing something about the physical forces which build up volcanoes and coral islands or wear down mountains, and the whole cycles in the evolution of land-forms. It is something more than this. Each district or region of the World has not merely its own form or skeleton, but its own activities and qualities. All these aspects have to be understood before we can obtain any complete conception of a district or of a region, or of how man fits into it, or is "controlled" by it. Mountain, plain, and coast have their inalienable characteristics. So have forest, grassland, and desert. A forested mountainland differs from a forested plain. Man settling in any one of

them becomes part of a vast but distinctive geographical individuality or organism, which we may term a natural region. He becomes incorporated in this natural region, its seasons regulate his life, and within very definite limits its conditions determine his activities and his ideas. We must think, however, not so much of the single man as of the social group; of men, not of a man. We must think not merely of groups of men, but of these groups forming part of a more complex whole, in which they live, move, and have their being. The power to do this is one of the more important results of this way of looking at the Earth. It is obvious that the names of the features of any regions, its peaks and valleys, its capes or bays, its groups of man's dwellings, or in short all the place-names which constituted the essence of the old geography, are of little importance. Some should be known, just as the names of a few of the leading men of history should be known. Hence a very rigorous limitation of place-names is necessary in order to get rid of non-essentials. On the other hand, names descriptive of character—shapes of land, qualities of the air, associations of plants, groupings of peoples—are necessary, and unfortunately as yet these are not always defined or used with precision or with discrimination. Many terms are slowly coming into use. The teacher will find that clear conceptions are necessary, and that precise terms are essential. He will use such as are applicable, but he will find now and then that it is necessary to say that there is no generally accepted term for this or for that. He will also have to guard against a common failing which makes many boys and girls, and also older people, believe that they understand a thing when they can name it.

The recognition and description of geographical characteristics is one of the chief things for the teacher to aim at. Another is the recognition and description of the characteristic life of man in each region. The recognition of regions of the same type leads to questions of how far similar causes have produced similar results. The comparison of regions, similarly situated and of similar type, leads to a comparison of the peoples who live in them. At this stage the importance of social inheritance as well as of environment should be enlarged on. This will lead to a consideration of

what is the natural outlook, the natural ideas of peoples in different regions with different seasonal rhythms, on the world and life; and also to the suggestion that growth and change of traditions and outlook constantly occur.

The recognition of natural regions or divisions of the globe with a recognisable individuality is therefore of great importance to the teacher of geography. It gives him not a dead subject, but a living one which stirs the imagination. It also lends itself to fascinating exercises which keep the pupils' minds active, and permits comparisons and contrasts which save much time when compared with old routine methods. The way to start is with simple graphic descriptions of the life of man in different kinds of environment or homes—the understanding of the Eskimo and his kayak, the Bedwin and his horse, and so on. This should be followed by the examination of different types of natural regions and lead up to the complicated and difficult interpretation of the very real but very subtle connection between the human part and the rest of a natural region. The ways of doing so are many. The interests of pupils and teacher and the character of the home district have all to be taken into account in planning detailed courses. The following pages are not exhaustive, but are meant to point out some of the better ways in which this may be attained.

II. Elementary Geography

General Aims of Geographical Teaching in Elementary Schools.—The teaching of Geography in elementary schools will differ somewhat from that which is suitable in the lower forms of secondary schools, because for the great majority of the pupils it represents the whole of the formal instruction which they will receive in the subject. The course in such schools will therefore be complete in itself, whereas in the lower classes of secondary schools it looks forward to more advanced teaching later. This will affect details rather than principles.

The aim of such instruction is twofold. First it aims at giving a framework of facts into which can be fitted such later knowledge as is acquired from experience, books, or newspapers. Secondly it is directed to ensure that pupils may be trained to think

geographically on subjects which involve geographical considerations. The development of scientific Geography in recent years has tended to some extent to alter the character, and probably to limit the number, of facts which are considered necessary as a framework, and greatly to emphasise the importance of training modes of thought.

Under the latter heading are included two sides, (1) the more imaginative, and (2) the more purely intellectual side.

1. **Imaginative Side.**—On the one hand Geography presents to the young pupil pictures of life under very different conditions. Even in his own country it shows him a vast variety of occupations. In distant countries it acquaints him with strange manners and customs, with social organisations rising from the simplest conditions of savagery to the complexities of European life, and with political institutions no less diverse. At the same time it shows him that his own countrymen are united with these strange peoples by many bonds. They buy, sell, and compete with them, and in some cases rule them. This discovery arouses interest and sympathy. It broadens the mind as actual travel broadens it. This in itself is a valuable result in the case of citizens of an Empire which possesses a world-wide trade and political relations and is responsible for the government of races in all parts of the globe. This side of the work demands stimulating teaching, adequate pictorial and literary illustration, and a knowledge on the part of the teacher of sources of descriptive information.

2. **Scientific Side.**—On the other hand stand ideas and modes of thought of a more definitely scientific order. As Geography deals with the effect of physical environment on human life, it overlaps certain branches of Physical Science on the one hand and the human science of Economics on the other. Whether physiographical principles are taught in the first instance in the Nature-study or in the Geography lesson, their effects on human beings can only be taught as Geography ; while there is no other elementary subject which, by dealing with concrete economic facts, can prepare the pupil's mind to approach the more abstract economic questions which are more and more appealing to the interests of the modern working man. This side requires a carefully planned and graded curriculum, of which all the stages

shall converge to create the ideas which are considered possible in the highest standard.

History of Geographical Curricula in Elementary Schools.—The older geographical curricula mainly aimed at giving a knowledge of facts and, even when dealing with industries, confined themselves largely to cataloguing. Later, accounts of industrial processes and lessons to the lower standards on strange animals and plants were admitted under the head of Object-lessons, which gave them a disconnected character and failed to set them in their true environment. Physiographical matter was introduced as Elementary Science. In this respect the boundary between Geography and Nature-study is still undefined, but the tendency to separate the teaching of the phenomena themselves from their wide geographical results, which arose from the existence of Physiography as a separate subject in the syllabus of certain examinations, is gradually disappearing.

It is impossible to summarise existing geographical practice. The rapid progress of the subject has been marked by greater life in the teaching, by the adoption of improved maps and other apparatus, and by the introduction of more " Home Geography " in the lower standards ; otherwise the greatest differences exist according to the literary or scientific bent of the particular teacher, the locality, and many other considerations.

General Principles underlying a Geographical Curriculum.—In arranging the general plan of geographical work in an elementary school, three principles stand out prominently. They depend partly on the nature of the subject and partly on the development of the pupils' capacities and interests.

The first is the adoption of regional methods in teaching the different parts of the world. That is to say, physical units are taken as the basis of study and, in the case of each unit, the sequence of cause and effect is traced from the ultimate physical reasons to the final human consequences.

The second relates to the study of the underlying physical principles. On the one hand the earlier work must be sufficiently observational and concrete to be intelligible to the immature minds of the younger pupils ; on the other, the principles themselves must be grasped soon enough to be made the basis of

explanations and problems in the regional work of the higher standards. This principle recognises that ideas are built up inductively from concrete observations and descriptions, but that they only become a complete part of the pupils' working store after they have been applied to new material at the higher stages.

The third is necessitated by the very varying degree of complexity exhibited by different human communities. No pupil can be expected to understand the more complex economic, social, and political organisations till he has some acquaintance with the simpler conditions of less elaborate societies. In introducing the life of the huntsman, the shepherd tribe, and the farming village before we deal in detail with the industrial conditions of modern Europe, we are not only following the historical order of advance, but are appealing to the natural instincts and interests of young children.

A scientific curriculum can only be worked out fully in a school in which every class has a separate teacher. In small schools where the pupils can only be divided into two divisions, graduation is a matter of great difficulty, and, although the broadening effect of Geography is still possible, a less ambitious aim must be set as regards the teaching of climatic laws and the creation of economic ideas.

As the progressive character of a geographical course depends on the graduation of the work both on the physical and on the human side, a preliminary consideration of each of these two branches is necessary.

Work on the Physical Side.—The physical side of Geography includes (*a*) the Astronomical, embracing the shape and movements of the earth, and their consequences in day and night and the seasons; (*b*) the Meteorological, embracing the wind systems of the world, evaporation, condensation, rainfall, and temperature; (*c*) the work of water, wind, and other forces on the crust of the earth.

Astronomical Work.—The astronomical side need not detain us long. Some of the material is simple enough to be taught at a very early stage, whereas the seasons are so difficult that the relations between the astronomical causes and the resultant effects on length of day and the altitude of the sun in different

parts of the globe, cannot be properly grasped by the mass of children of elementary school age. In this case these resultant effects must be treated as ultimate data. A careful course of observations on these effects, as they are exhibited in this country, will therefore be required, and this may reasonably be considered suitable work for the lower middle standards.

Physiographical Work.—The work of water, wind, and other forces on the crust of the earth is, however, the most suitable of the three classes of material for observational work, both with lower and with upper classes. In the lower classes this work is naturally directed to simple observations of local examples of principles which, acting on a larger scale elsewhere, have a considerable effect on human life. In the upper standards, if this work is continued, it will be rather as a training in quantitative methods of observation, and belongs to the article on Nature-Study.

Meteorological Work.—The meteorological side does not lend itself so readily as the last to observational work at the lower stages. The principles of evaporation and condensation require experiments in the class-room, and the actual formation of clouds can only be observed at its best in a mountainous district. The bulk of the work on this side, however, consists in explaining the causes which determine mean temperature, variations of temperature, prevalent winds, mean rainfall, and its seasonal distribution, in the various climatic belts of the World. As this work deals with conditions which exist in a variety of regions, it cannot be based on direct observations, and each principle must therefore be explained along with the countries which best illustrate it in the regional course. If it be coupled with vivid descriptions of the climatic conditions of these regions, it is full of interest, provided it is introduced only after the course of observations on astronomical phenomena at home—that is at the upper middle stage. In the upper standards the pupils will apply the principles which they have thus learned to anticipate or explain the climatic conditions of other countries.

Work on the Human Side.—The work on the human side of Geography requires similar graduation. In country districts the children become acquainted with the processes of agriculture

early in their school career, and the teaching of the variety of existing industries will appear as a continuation of the observational lessons on this subject. Both in town and in country the children usually hear enough of the existence of other parts of the Kingdom to have their interests aroused for descriptive matter on the life of the farm, the mine, the factory, and the port. The ideas of cause and effect which can be created in the minds of young children by an account of the elaborate industrial system of a manufacturing and commercial country like Great Britain are, however, necessarily few; and for the earliest clear notions of the dependence of man on his environment, we must look to the accounts of life, under simpler economic conditions—of the North American Indian, the herdsman of the Steppe, and the agricultural community of Bengal. A well-graduated course will therefore postpone to a late stage purely industrial regions such as Europe and the more detailed treatment of the British Isles, and will take first the continents in which Man is in more immediate contact with the natural conditions on which his livelihood depends. Particular value from the economic point of view attaches to accounts of settlements in new regions. "Land" and "labour" are there presented in their simplest relations, and "capital" is seen in process of creation. The economic geography of the colonies is therefore more easily understood than that of the mother country.

It is now possible to deal separately with the work in each section of the school.

Work of Lower Standards.—In the lowest standards, before Regional Geography is begun, four kinds of teaching may be distinguished: (1) lessons on the earth as a whole, (2) observational work in the neighbourhood, (3) simple descriptions, (4) explanation of the meaning and use of plans and maps.

1. **On the Earth as a Whole.**—The shape of the earth is necessarily taught early, but the real proofs are not intelligible to young children. They appreciate the fact of vessels sailing round the earth; the rest is a matter rather of amplification and of illustration than of proof. The cause of day and night presents little difficulty. At this stage elaborate apparatus is undesirable, The points of the compass will be taught as indications of direc-

tion ; they are frequently marked on the floor of the class-room. Suitable to this age, though not essential, are lessons which induce the children to observe the phases of the Moon and the brighter constellations. Information on the Solar System, the annual revolution of the earth, and other matters which cannot be associated with observation, are best postponed to a somewhat later period. The children will be taught to recognise the obvious characteristics of the four seasons in their Nature-Study, but time should elapse between this teaching and any formal association of the seasons with this side of Geography.

2. **Observational Work in the Neighbourhood.**—" Home Geography " has received a great impetus in recent years. Over a century ago Rousseau declared that Geography must begin both with the widest idea of the earth and the narrowest concentration on the immediate neighbourhood. One aspect of this " Home Geography " will be discussed in the section on the introduction to maps. The other is closely associated with Nature-Study.

The simplest beginning is with the work of water as the most obvious agency which is modifying the surface of the earth. To some extent this can be illustrated by the drainage of the rain which falls on a gravel playground or on the street. Visits to a brook are, however, desirable ; and a small stream is often preferable to a large river. As the article on Nature-Study is the natural place to discuss the organisation of expeditions, it is sufficient here to enumerate some features of a stream which have geographical significance. Observations may include the variations of pace in the middle and at the sides, the normally bending course, the greater rate of flow on the outside of a bend, the relative steepness of the bank on that side, the deposits of sand on the inner side, the increased amount of sediment that can be obtained in flood-time, and possibly the existence of material held in solution which can be obtained by evaporation. The chief generalisations to which this work will lead are that acceleration of rate leads to increased denudation and carrying-power, while retardation leads to diminution of carrying-power and to deposition. Both observation and inference should as far as possible be the work of the pupils, and technical terms should be avoided. Though depths may be compared by marks

on a stick, and rates of flow by floating small twigs, elaborate quantitative work is impossible at this stage.

Teaching on clouds in most districts has to rely on explanation, description, and experiment to fill gaps in observation. In mountainous districts, however, it is often possible to watch the formation and disappearance of clouds on a hill-side. As a current of air approaches the mountain, condensation can be observed taking place at a certain level, while on the other side the falling clouds reach a point at which evaporation occurs. Misconceptions as to the apparent solidity of clouds can often be removed by observing their formation even in districts where there are no mountains on which they can rest; and children can be taught to distinguish the chief kinds of clouds.

Snow, ice, dew, and mist may be noticed; and graduated work in explaining springs and the underground work of water is desirable. Further discussion of these subjects falls better under Nature-Study.

3. **Descriptions.**—Even before systematic Regional Geography is taught, there is room for descriptions, not only of such great types of scenery as mountains or the sea, which are not to be found in the neighbourhood of the school, but also of typical regions such as the Poles and the desert. They pave the way for later work and appeal to children's curiosity and wonder. The animals of such regions specially interest them. For pictures, size and colour are at this stage of more value in giving a vivid general impression than quantity, variety, and detail such as are needed later. These aids do not relieve the teacher from the need of verbal description, since children have not the experience of the adult by which to interpret pictorial representations. Even the physical sensations which a traveller would experience in the regions which are represented, such as heat, cold, the glare of the sun, or the sharpness of a cutting wind, must be added by verbal description; while the picture is only the starting-point as regards accounts of the animals, vegetation, and inhabitants. For purposes of description a teacher must have formed a clear image of the scenes which he is describing, and should feel some emotional tinge towards them such as can be obtained from a novel or story of travel. It is useful to study the treatment of this

kind of material by able writers who have the power of appealing to children—*e.g.* Rudyard Kipling in the two Jungle-books.

4. **Teaching of the Meaning of Maps.**—There are two ways of introducing children to the use and understanding of maps. The most common is to begin with a plan of the class-room. The teacher, after explaining the idea of drawing to scale, does most of the actual drawing on the blackboard himself, but the more promising pupils suggest what shall be inserted, and the rest take part by identifying what has been drawn. In subsequent lessons the teacher proceeds to the school, playground, and neighbourhood. Eventually he constructs a plan of an area large enough to correspond to part of the Ordnance Survey town plans or of their six-inch maps. After a course of such comparisons, the meaning of a map is sufficiently understood to enable him to use maps of areas which are not already known to the children.

The second method, which accords with the growing tendency to retain the methods of the infant school in the lower standards of the upper department, is to begin by constructing rough models of the district in a large sand-tray. In hilly districts, on the coast, and even in places where a stream can be found flowing in a valley slightly lower than the surrounding level, this is quite easy. Expeditions to convenient points of view are made. Children are much interested in the construction of these models, and readily suggest places where small pieces of wood shall be placed to mark their homes or well-known buildings. The transition from such models to a map is easy, and brings home to the class the need of shadings on the map to mark altitude. If this method is adopted, the planning of the class-room will follow it.

It is unnecessary to state that the old method of devoting the first year to a course based on the definitions of geographical terms is fast becoming obsolete, as it is realised that these terms have not that precise character which renders them suitable for scientific definition, and that their use becomes familiar to the pupils through incidental repetition in connection with home geography, map-making, and description.

Work of the Lower Middle Stage.—We pass to the work of the

lower middle standards. It has frequently been urged that after the study of the immediate neighbourhood should follow the home county, adjoining counties, England and Wales, and finally the British Isles. This plan, however, has no true basis either in utilising the child's environment or in the logical development of the subject. Outside a very limited area the pupil has no direct acquaintance with what is described, his interests more often lie in the wonders of unknown lands; and experience of the method leads to the conclusion that it frequently results in burdening his memory with unnecessary names and with industrial facts for which he is not yet sufficiently advanced to understand the reasons.

If we regard this stage as a development of the preceding stage and a preparation for the Regional Geography which is to follow, it will presumably contain three elements: (1) further observational work, (2) some treatment of the British Isles, and (3) descriptive matter intended to introduce the idea of man's dependence on his environment.

1. **Observational Work.**—As regards observational work, any of the topics suitable at the last stage can be continued. Observations can now, however, be made more definitely and can be recorded in charts, since children are now more capable of extending their thoughts back beyond the immediate present and of understanding the use of numbers. The length of the shadow of a stick cast by the sun at noon can be observed, marked at regular intervals, and thrown into the form of a chart which will show his decreasing altitude from the autumn equinox to the winter solstice and his increasing altitude thenceforward to the summer solstice. Charts of the time of sunset can also be made, though it cannot be observed in school hours. Thus, in the course of a year, the material can be gathered for understanding the dependence of the seasons on the length of day and the altitude of the sun, and can from time to time be systematised by definite lessons. The use of the thermometer and rain-gauge may best be discussed under Nature-Study.

2. **Early Treatment of the British Isles.**—It is inevitable that some attention should be paid to the British Isles before Regional Geography of other parts is begun, but no treatment

with children of this age can be a satisfactory substitute for time devoted at a more advanced stage. They have not yet formed adequate ideas of the economic needs of mankind, nor do they know anything of the countries which produce our raw materials. This early treatment will necessarily differ according to the locality and industrial surroundings. For instance, in dealing with farming, the teacher in a country school will be merely systematising the children's previous knowledge; in a town school he will frequently be confronted with a descriptive task of some considerable difficulty, if the series of lessons is really to interest the children in country life and give an adequate picture of its various branches. Even farming presents differences —crop-growing, dairy-farming, mountain pasture, market-gardening, hop-growing, etc.—each more or less specialised in different districts. Descriptions of mining, of the stages of the metal industries from the extraction of the ore to the production of the finished article, of the great staple manufactures such as cotton and wool, of a port, of a naval centre, of London as port, distributing centre and capital, and of various typical regions within these islands will make an adequate course, without introducing many names of towns, natural features, or political divisions, which can well be kept for subsequent treatment. Some idea is thus given of the variety of existing occupations before we reach any definite teaching of the dependence of occupation on environment.

3. **Descriptions of Primitive Peoples.**—It was held by Rousseau that Robinson Crusoe suggests the right point of view in introducing children to economic teaching. The view has an element of truth. Children always take a great interest in the simpler forms of life such as that of the American Indians. A course might be introduced on Man at the lower levels—*e.g.* the hunting stage, which should fix attention on the means at his disposal for obtaining the prime requisites of life and his dependence for success on his environment. This would make it easier to trace the growth of the higher stages of pasture and agriculture in the regional course.

Work of the Upper Middle and Upper Stages; Regional Geography.—We now reach the stage of Regional Geography proper,

at which the sequence of causation from the physical to the human is brought out in the case of each natural region.

The task of arrangement is considerably simplified now that the regions of the world have been classified by geographers on a climatic basis. Needless iteration is avoided if it is determined to bring out the main characteristics of the climate, vegetation and resulting human activities in the case of some one example of each type of regions which may serve as a standard of comparison whenever other examples of the same type occur. Along with every such representative area will be taught (1) those climatic principles which specially determine its climate, and (2) that stage of economic development which has been particularly associated within.

Connection with Climatic Side.—Thus, on the climatic side, the polar regions and the equatorial belt of forests bring out the causes which determine mean temperature. The pupils have already obtained from their course of observations at home a sufficient idea of the dependence of seasonal changes on the apparent movements of the sun to be able to imagine his movements in other regions from description, and to follow an explanation of their consequences. The contrast between his movements at the Pole and Equator sufficiently explains the two extremes of heat and cold. The seasonal extremes of temperature resulting from the backward and forward movement of the belt of greatest heat are brought out in connection with the deserts, steppes and savannahs in the hearts of continents. The change of seasonal winds can then be easily introduced along with the monsoon regions, though it may be necessary to omit explanation of the easterly or westerly trend. The contrast between the two last-mentioned types (the intra-continental and the monsoon regions) leads to the causes which determine rainfall. The study of winds and rainfall is completed in connection with the temperate western belts of continents.

And with the Human Side.—Taking these same types of regions from the human point of view, we find that the extremes of heat and cold illustrate the simplest forms of human society, the deserts, steppes and savannahs, the pastoral life, the monsoon regions, the purely agricultural type, and the western temperate

belts of continents in the case of Europe, the most complex forms of economic and social life. In each case the dependence of the human on the physical conditions is apparent. The other climatic regions, *e.g.* the high plateaux and the sub-arctic forest, will be found a place, but are less important from either point of view.

Inductive and Deductive Treatment of Regions.—The usual area chosen for each course is a continent. Consequently countries of the same type will appear in several courses ; for example, practically all the types exemplified in Asia also appear in North America. This is of great advantage in securing a virtual revision of all past work. The children's knowledge is gradually systematised into a scheme of different regions. The method of treating the same type of region will vary considerably at its first and subsequent appearances. In the first instance the teacher has, in the shape of copious descriptions and careful explanations, to provide the material out of which the general ideas of the class are built up. When a second country of the same type appears, the pupils may be expected to reason out far more for themselves. The teacher's work will be largely to ask such questions as will stimulate them to anticipate what may be expected, and only then will descriptions be given to show how far their expectations correspond with reality. An attempt will then be made to think out the reasons for any differences which may appear.

Aspects of Treatment of the Several Continents.—Of the six continents, Asia gives the widest variety of climatic types and the whole succession of earlier stages in man's development. North America and Australia illustrate the dependence of human activity on environment in a manner less suitable for beginners but even more convincing for pupils who are slightly more advanced. Geographical conditions are there seen determining the occupations of men who have inherited centuries of European civilisation. The simpler occupations reappear in the pastoral life of the Western ranchers and the agriculture of Manitoba, as well as more elaborate stages in the commerce of New York and the manufactures of Pittsburg ; but the rapidity of growth in both cases makes the underlying causes more easily seen. Indeed the causes which determine the growth of manufactures are better

seen in North America than in Europe. Europe presents a body of states at the most complex level. Africa and South America are continents suitable chiefly for deductive treatment, as the process of utilising them for the needs and by the methods of civilised man is still in its earlier stages.

Method of Treating a Continent.—The older method of treating a continent or natural region such as the British Isles was two-fold. First, lessons were given on the coast, structure, climate, and industries of the whole: then the main divisions were taken. Modern Geography reduces the preliminary work to a short survey of the physical map sufficient to divide the area into main regions which present general climatic, vegetational and industrial similarities. If the region is then sufficiently uniform to need no further subdivision (*e.g.* the steppe), the teacher takes in turn the structure, climate, products, and industrial and social life, showing the bearing of each element on those which follow. No fixed order can be laid down for the rivers and the coast-line; for instance, it may be convenient to take the rivers with the structure, which determines their direction, or to defer their consideration till we reach the climate, which may determine their volume, variability, and utility. A more complex region may require further subdivision; for instance, India presents certain general climatic features which can be best taken together, while for more detailed treatment separate parts require separate discussion. At the end of the course a series of revision lessons comparing the different regions of the continent under specific headings, such as rivers, climate, and trade, serve to systematise and revise what has been learned under the separate divisions. In the case of the British Isles, the influences determining the climate require a place at the beginning, while the foreign trade, being dependent on the industries, is naturally taken after the separate treatment of the main industrial areas which in this country form the best basis of subdivision.

Relative Importance of Different Classes of Facts.—Newer conceptions have altered the importance attached to memorising the names of various physical and other features. Thus many capes, minor rivers, lakes, smaller coastal features, and specially the names and heights of peaks are unimportant from the point

of view of influence on human life. On the other hand, passes and other natural or artificial means of communication are generally of great importance. The number of towns is reduced, while the analysis of the causes to which they owe their importance is greatly emphasised. Few countries outside Great Britain have more than a dozen towns on which we have time to concentrate attention in an elementary school. Political divisions other than states are usually of little significance, though the counties of England and Wales are necessary as a framework into which new place-names which an Englishman is constantly acquiring in later life can conveniently be placed. Even in the case of England a hundred towns appears to be ample, though two or three times that number are often taught.

Descriptive Elements.—Throughout, vivid description, pictures and other expedients which were utilised at the earlier stages are still required to give the pupils an idea of the reality of the facts which are being learned, and to rouse their interest in the inhabitants of the various countries. The purely intellectual teaching of causal relations will not be impeded but assisted by a vivid realisation of the facts themselves.

Sympathetic Accounts of Peoples.—In particular the descriptions of life among uncivilised peoples, and of the great Oriental civilisations which differ from our own must be such as to arouse not only interest but sympathy. One of the great aims of Geography is to remove any impression that divergence necessarily implies culpability or even inferiority. It is not meant that the pupils should be aware of this purpose, nor that moral defects or industrial inferiority, where they exist, are to be explained away.

Teaching of Occupations.—The conditions on which each kind of occupation depends are taught in the first instance in connexion with some particular region. Later, after a number of regions in which the same occupation flourishes have been reached, a systematising lesson is needed on the general sources of supply of that particular product. It must also be remembered that industrial facts are in a constant state of change. They should therefore be taught in a large measure historically. The present is only a chance point in a series of changes which may be expected to continue for some years before the pupils have attained an

age at which they will require to use the information. Thus, a systematising lesson on the sources of our wheat supply would include a historical sketch of the relative importance of such sources in different decades and suggestions of possible future developments.

Work in Map-making.—With regional work in the higher standards, definite exercises in map-making are necessary. These should be directed in the main to bringing out single definite points. The purpose will sometimes be to suggest operative causes, as in the case of the physical features and routes which determine the positions of great towns, where the distances and gradients of different routes are brought out better by practical work. In other cases statistical material such as the distribution of different products is better impressed by being thrown by the learner into the form of diagrams or maps. In the case of the learning of the counties and railway routes of England, it is a pleasant variation from memory work, and much surer in its effects. Possibly the cyclostyling of the counties on thin pieces of cardboard, which the children could cut out and afterwards piece together as a puzzle, might be found a useful exercise for teaching what is ordinarily a dull piece of routine.

Higher Work.—Regional teaching will constitute the main work of the higher standards of an ordinary elementary school. There is, however, scope for observational work outside the regional course. Provision has likewise to be made for the separate work of Standard VII. and of the higher classes of higher elementary schools, though, if any great extension of the course is thus rendered possible, it will follow the lines of secondary school work. Such higher work may embrace a selection from the following branches, several of which are valuable as exercises in scientific methods, rather than as helping to create the ideas which constituted the more limited aim adopted at the beginning of this article: (1) outdoor work, applying quantitative methods to the observations, which were previously less exact; (2) elementary surveying; (3) exercises in meteorology, such as filling in isobaric and isothermic lines from data supplied, and roughly interpreting weather conditions from observations; (4) map-making exercises, such as the insertion of contour lines,

the drawing of cross-sections of contour maps, etc.; (5) courses of a more definitely economic nature designed to make explicit the principles which have been implicitly taken in considering the dependence of industries on environment, their growth and continuance, their relation to means of transport and to markets, and the growth of towns; (6) exercises in which commercial facts are represented by maps and diagrams. The British Empire is sometimes taken as a year's work; and, though this is not to be recommended until the countries which compose it have been taken for the first time in connexion with their natural geographical setting, it may form a convenient means of introducing a revision of the World and a general survey of its sources of supply and markets in a Seventh Standard.

Apparatus.—In considering the apparatus which is required in an elementary school, due regard will be paid to the necessary limitations of funds for the teaching of any one subject.

Maps.—A school needs good bathy-orographic vegetation and rainfall maps of all the continents, the British Isles, and perhaps England and Wales. The older type of political maps should be discarded except in the case of England and Wales, where it is required for teaching the counties. The higher standards require atlases, in which the maps should be mainly physical. Ability to use an atlas as a work of reference is necessary in later life, and it is even more important to give the means of acquiring information than to give information itself. Satisfactory atlases can now be obtained for a shilling. Outline maps costing a penny each are useful for working exercises and filling in detail. It is inadvisable to use Mercator's projection with younger children, owing to the distortion of sizes. When dealing with the earth as a whole, a globe should be used as much as possible, and the double hemisphere map where a map is required. In any higher exercise work in which the nature of the projection is an essential element, some explanation must be afforded. At the lower stages, considerable use should be made of the local section of such physical maps of the British Isles as those published by Messrs. Bartholomew & Co., and of the various Ordnance Survey maps of the locality. Children should from the first be taught to understand the meaning of shadings, and in the un-

shaded Ordnance maps a few shades should be painted in by the teacher from the contour lines. Younger children cannot be expected to picture a country from contour lines without shading, though work with contour lines is valuable in schools with adequate provision for standards above the Sixth.

Pictures.—Pictures include (i) wall pictures capable of use by the whole class at once during the lesson; and (ii) smaller pictures which have to be used otherwise. The use of the lantern extends the range of the former, but necessitates much preliminary and subsequent teaching to secure that the pupils grasp the significance of what they see. As the number of wall pictures must necessarily be limited, it is best to exclude views of particular towns and buildings which do not represent anything general, in order to make room for such as give representative types of scenery, vegetation, and human life. Pictures of scenery may be intended either to give a general impression, such for instance as that of snow-covered mountains, to younger children, or to serve the more scientific purpose of explaining the kinds and origin of scenery; but, as for this purpose a comparison of a number of views is generally required, most of them will be of the smaller type, or else the lantern will be used. Wall pictures illustrating typical scenes in great natural regions, such as the desert or the polar regions, are required for the lower standards, as are pictures representing typical flora, such as that of Australia, and human life in countries with civilisations unlike our own, such as China and Japan.

Smaller pictures for illustrating types of scenery scientifically can be bought in sets. But all teaching of the various countries can be made more living by a variety of pictures which cannot easily be classified: the cheapest way is for each teacher to make his own collection from picture postcards, illustrated magazines, and any other available source, and to keep this collection sorted for use when the country in question is reached. They may be placed on the walls for a definite time, so that children can inspect them fully before or after lessons. Cheap children's books, with full-page coloured illustrations giving a really good impression are now published at prices which should ensure their addition to class libraries.

Books.—Considerable difference of opinion exists as to the desirability of using text-books in the higher standards. The policy of compromise by combining what is substantially a text-book with use as a reading-book is to be condemned from the point of view of the reading lesson. The aim of this lesson is to create the habit of reading and to direct it into literary channels. Books of travel or extracts from them are the true geographical reading-books, as they satisfy both these requirements; they may be simplified for the use of the lower standards. Class libraries should be furnished with further material of the same kind.

The teacher needs to have access to books of extracts from travellers and other first-hand sources which will provide materials for description; and, if possible, to some of the larger illustrated and descriptive accounts of the World. The value of reading novels laid in various regions and other matter which gives atmosphere cannot be over-estimated. For economic and other statistics which are constantly changing, access to the *Statesman's Year-book* in a free library or elsewhere is desirable.

III.—Geography in Secondary Schools

Modifications of Elementary Course in Secondary Schools.—The fact that pupils remain in secondary schools until they are fifteen to seventeen years old permits a somewhat fuller and more systematic treatment of parts of the work outlined in the previous section for elementary schools. The modifications of the general plan already outlined will depend, however, mainly on the locality and the interests of the pupils and teacher, which will lead to slightly greater or less emphasis being laid on this or on that aspect, rather than to any fundamental change of plan. The aim will be the same, and the importance of training geographical modes of thought the chief endeavour. In dealing with the curriculum of the upper forms, a geographical skill and knowledge equivalent to that outlined for the elementary stage must be assumed at the beginning.

It will be better in this section to deal very generally with principles which should guide the planning of a course rather than to describe one in detail.

On one point it is necessary to be emphatic: geography needs

more, not less consideration, as the pupil grows older. As it deals with the theatre of man's activities, and as a more and more comprehensive view of man's work, thought, and ideals becomes possible in the upper forms, the correlation of the two becomes more subtle and difficult, and at the same time more important. No doubt there must be co-ordination; geography and history are bound to be two of the chief co-ordinating subjects, and each must be co-ordinated with the other. This is not the place to discuss the present specialist anarchy. This article is not meant to urge a new specialism and specialisation, and it should be read as a plea for synthesis. It does, however, urge that the master who has to carry out the higher courses, in which a synthetic outlook is given, should have had a sufficient geographical training to deal adequately with different environments.

At an early stage in the teaching of pupils over twelve or thirteen, a first synthesis should be attempted, by a revision during two or three terms of the geography of the world as a whole. This should include a brief analysis of (*a*) the typical features of mountain systems, highlands, table-lands and plains, and the coasts they form; (*b*) the way in which the features control routes and settlements, and (*c*) the general distribution of each type of feature. Examples of (*b*) should be asked for from knowledge previously gained. Next the characteristics and distribution of the more important vegetations should be studied—dense forests, open woodlands, grasslands, scrublands and deserts in hot and temperate or cold regions. Again, examples of their influence on man's work and ways should be asked for and then enlarged upon. Then the causes of these distributions should be sought and the simpler climatic conditions of the World examined and explained as fully as is possible at this stage. The stages will be from vegetation to rainfall, from rainfall to winds, from winds to hot and cold regions, and back to the seasons, day and night, and Earth and Sun.

During this revision it would be possible to introduce lessons, some of them practical, on the ways in which various maps are made. Any out-of-door surveying is even more a matter for the geometer than for the geographer, but it is best for both masters to co-operate. The *quality* maps, as they may be called, which

show climatic conditions, or vegetation, or density of population, occupations, etc., will have to be explained by the geography master. He must, however, guard against substituting a knowledge of maps for a grasp of geography. While he ought to use statistical, descriptive, and practical aids to lessons freely, he must not make the lessons purely studies of statistics, descriptive passages and pictures. If he makes the object of the lessons the study of the Earth as man's home, and the understanding of man's environment, this is not very likely to happen.

The next four to six terms should be given to a new study of the World in natural regions, paying a little less attention to the primitive, "simple" occupations, and a little more to the more complex economic social life of the people. It will be found more satisfactory to work out, for each region, one or occasionally more special problems in greater detail: *e.g.* raw-cotton growing with S.E. of N. America; cotton manufactures with Lancashire or New England; gold mining with the Transvaal; irrigation with Egypt; transit trade with Singapore or London; strategic fortresses with eastern France; administrative centres with London; culture centres with Paris or Florence; spiritual centres with Jerusalem or Mecca. In every region a very brief outline of the history of the people might be attempted; but this will be found very difficult with the materials at present available to the ordinary teacher. Undoubtedly a considerable time ought to be spent on the Jewish, the Greek, and Roman worlds—this might form the last term's work, or last but one, of this stage of the courses.

The order of study may be varied. There is much to be said for taking North and South America first, and then comparing the analogous natural regions in the two. Then New Zealand and Australia, Africa, Asia, Europe and the Mediterranean. If desired, the British Isles, with a brief examination of the overseas expansion of the British Empire, might form the last term's work.

While this systematic and comparative study of regions should not be overburdened with too much detail, it should necessitate a precise knowledge of general characters, sufficient to draw clear, if diagrammatic, sketch maps of at least coasts, rivers, highlands, rainfall, vegetation, routes, and towns. Thoroughness in what is done rather than vague impressions of much information

should be aimed at. The teacher needs to exercise great judgment in selecting, as well as in presenting and interpreting, the facts to be learned. He must have mastered them himself. He will constantly call attention to similarities and differences between different regions, and accustom the pupils to group them into types.

Following this there might be two or three terms' revision of World geography, this time of a deductive character, leading up to fuller explanations of physical, biological and human conditions. For instance, one term might be given to land forms, and their shaping—during which some elementary physical geology should be taught and the idea of cycles of land forms introduced. The different forms of similar structure produced by different erosion agents, and the others produced by the same erosion agent in lands of different structure, would be examined, and lead up to a simple classification of land forms and the division of the World into districts with different physical characteristics. In all cases the resulting influences on man's life and work should be taken seriatim. In schools where boys remain until eighteen or nineteen this might be revised later in a term in which some attention is paid to physical history of each continent.

A term might be devoted to the deductive study of climates, beginning with rotation and revolution, differences of sunlight, insolation and temperature at different seasons, and the influence on pressure, winds and rainfall, A more exact idea could gradually be built up of the characteristics of the different climatic regions, and a fuller explanation of them be attempted. This would lead on to a third term's work showing the influence of these climatic factors, and of soils on the distribution of vegetations. More subdivision of these might now be attempted, and the animal life of each examined. This would lead to a more careful examination and classification of natural regions, the chief varieties of each type, and the social organisations as well as the general economic interests and activities in each. The facts of the past study of different natural regions are thus revised and compared ; and the similarities and differences between them brought out. Place, work, folk ; natural conditions, man's utilisation of them, the way they affect his character and ideals : these must constantly

be in the teacher's mind, and unconsciously they should become part of the pupils' ordinary conceptions. The scientific training which stops at the enunciation of laws is incomplete and relatively worthless—the application of laws is the test the true man of science always imposes, and the complete man insists upon.

In schools in country towns more emphasis should be laid on weather and climate, on rocks and water supply, on soils and crops, both in the home district and in the studies of other parts of the World. In port towns the character and movement of the ocean, the great fisheries, the chief trade routes, especially those of local importance, will also be discussed in greater detail. In large industrial cities the geographical study of raw materials, power, labour, markets and routes will naturally be considered more fully; while in important centres of State or Church, the administrative divisions and centres will receive special attention.

In the upper classes of public schools the study of social geography and history, especially of the Mediterranean and European countries, will naturally be extended; but it is desirable not to forget on the one hand the fair statement of some of the problems of inter-tropical countries under European administration, not only from the European, but also from the native point of view, just as the problems of the self-governing dominions overseas as well as the great countries of India, China and Japan have to be stated from the point of view of the peoples even more than from our own.

IV. The Geography Room and its Contents

It is a great convenience when a room can be set aside for geography work. The desks should be large enough for an atlas to lie open, and for work to be done on outline maps. It should be possible to store atlases and maps, etc., either below the desk or in a special cupboard. Blackboards and a black globe are essential. The walls, best painted or papered white, should be covered with large wall maps above, and pictures below at a level at which they can be examined. These maps and pictures should be changed periodically. A series of World maps might be used as a permanent frieze, *e.g.* the eight World maps of the Oxford Wall Maps. When any country is being

studied, maps showing physical features without names, rainfall, vegetation, and routes and towns (all of which can be bought) should be hung up, and also thermal regions, density of population, occupations, which can be enlarged on outlines similar to those of the other continental maps from World or other smaller scale maps. It is often well to hang up first of all the physical-features map alone, and when this map has been studied, to leave it hanging, and place beside it the vegetation map, or one of the climatic ones, and so on, leaving each map hanging after a new one is put up, until the whole series is on the walls.

The simplest way to keep maps is to have them mounted and folded. They can then be pinned either to a wooden moulding or to a plain strip of wood fixed to the wall for this purpose. Or they may be pinned to a length of wooden moulding into which two rings have been screwed, with string between them, which will let the moulding, with its map, hang from a picture-hook or nail. When there is not enough wall space, the simplest and cheapest stand is made by taking three long bamboo rods at 4*d.* to 6*d.* each, putting a metal ring about one inch diameter, and a strong indiarubber band round the three rods, about six inches from their narrow ends, and then setting them up as a tripod. The string between the rings on the moulding can be put over the end of one of the rods, and the other two will act as supports to the hanging map. For those who prefer rolled maps a special cupboard is necessary, in which the maps can be hung from hooks, which should be arranged obliquely across the top of the cupboard for ease in seeing what each map is and in getting it out.

In all schools where it can be afforded there should be a lantern, so placed that it can easily be worked by the master. A part of the white wall can be used as a lantern screen, or a roll of white cloth or mounted paper can be hung up on a nail or picture rod when the lantern is in use. The lantern can be used in various ways, but as a rule it is advisable to make the slides summarise or supplement and illustrate points in a lesson, rather than to use it throughout the lesson ; or else to have the lantern lesson only occasionally. The lantern slides, whether views, maps, or diagrams, require to be carefully chosen to suit a lesson, as there is always a temptation to show any pretty pictures that are at

all relevant. It is generally possible to use a lantern without completely darkening a room, so that notes can be taken, and even references made to maps hanging on the wall. Where there is electric light, it pays frequently to turn it on, to point out on the wall maps places or features shown on the screen, and then turn it off again.

Cheap outline maps are not used nearly enough in schools. While map-drawing exercises in tracing coasts and rivers ought not to be neglected, outline maps permit pupils to copy vegetation, rainfall, and other conditions from their atlases, or the wall maps, with much saving of time.

Globes, models, specimens, and pictures are other essentials. For the storage of outline maps, and other maps in sheets, small diagrams, atlases, books, pictures, lantern slides, models, specimens, etc., cases should be built along one or more sides of the room. The upper part of the cases might be glazed on the top and sides, and in them models and specimens could be kept, which were relevant to the current course. These could be changed from term to term.

A small reference library should be kept in the class-room; suggestions for such a library, by Mr. J. F. Unstead, will be found in the *Geographical Teacher*, vol. iv., part 3 (1907).

Bibliography.—A very full bibliography will be found in the following book, which is an indispensable work for every teacher of geography. General guidance is given in the introductory chapters to the bibliography of each division of the subject. This book is the *Guide to Geographical Books and Appliances*. Prepared by Members of the Geographical Association. (G. Philip & Son, 1910. Price 5*s.*; to members of the Geographical Association, price 3*s.* 4*d.*)

Those who do not wish such a full bibliography may be recommended to turn to Mr. Unstead's suggestions for a school geographical library noted above, and to the catalogue of books in the reference library of the Geographical Association (*Geographical Teacher*, Spring Number, 1911, vol. vi., part 1).

The *Geographical Teacher* contains reviews of recent books and occasional bibliographical articles, in addition to special articles. It is published about the middle of each term, and

costs 1*s.* 6*d.* a number. It is issued free to members of the Geographical Association, the subscription to which is 5*s.* a year, payable to Mr. J. F. Unstead, Goldsmiths' College, New Cross, London, S.E.

There are occasional articles on Geography in the *School World* and other educational papers, and monthly educational notes in the *Scottish Geographical Magazine* (price 1*s.* 6*d.* a month; free to members of the Royal Scottish Geographical Society; price to members of the Geographical Association, 12*s.* a year).

The *Journal of Geography* is an American magazine for teachers of Geography, issued ten times a year.

V

THE TEACHING OF HISTORY IN SCHOOLS

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History is frequently described, and probably with truth, as the worst-taught subject in the school curriculum.

The reasons for this are manifold. In the first place, many teachers do not clearly understand what History is. Out of this arises a second difficulty: teachers have uncertain and wavering ideas as to why they teach it. Again, History is pre-eminently a subject which demands on the part of the teacher both a keen interest in the subject for its own sake, and a considerable amount of knowledge; yet in almost all elementary schools, and some secondary schools, any teacher is expected to be able to "get up" the subject, the result being usually that he gets up the text-book. Lastly, the problem of securing mental discipline by rousing independent thought and inquiry in relation to History makes the teaching of the subject a fine art, which is not necessarily mastered with ease even by those who thoroughly love their subject.

Thus the problems of History-teaching group themselves under four main heads: the definition of "History" as a school subject; the question of aims; the question of selection of subject-matter; and problems of technique usually known as Method.

Definition.—The first problem is that of definition. Very often what is taught under the term History in schools is really not History at all, but Chronology; that is to say, teachers narrate those past events which they conceive to be important, in order of their occurrence in time, and these occurrences the pupils are expected to remember, approximately in time order.

If one opens the *Anglo-Saxon Chronicle*, for example, one sees at a glance that History originated in Chronology and in this sense ordinary text-books are often mere chronologies. But the term History, in whatever connection it is used, should imply something more than a narration of occurrences in order of time. This is evident from such expressions as "History of Architecture," "History of Religion," "History of an Acorn," "Natural History." Correctly used, History, whatever its subject-matter, implies the development of something complex out of something simple; it shows events not merely in order of time, but as links in a chain of cause and effect.

It is, however, clear that the term History as used at the head of this article is an elliptical term; sixty or seventy years ago it was sometimes spoken of as Civil History, to distinguish it from Natural History. In its widest sense, what we now call History is the study of the recorded development of human society, of men in various forms of community life, from primitive beginnings such as Tacitus described amongst the German tribes of his day, up to complex forms such as we have in the modern British Empire. The unit of study is the community, not the individual. Thus English History is the study of the development of English national life. History has, therefore, not inaptly been called "Human Nature-Study." It is primarily concerned with societies, and with individuals as they affect and are affected by societies. For example, William the Conqueror is important because he helped to transform the rough Anglo-Saxon social life, the crude Anglo-Saxon government, and the half-formed Anglo-Saxon nation into the more developed England of the Norman Period; he is also important because his vigorous personality added something strong, determined, and ruthless to our national characteristics. Nelson is important because he helped to save the growing industrial England and the naissant British Empire from disruption at the hands of Napoleon, and so helped to give us the England that we know, and also because his character has moulded and inspired our ideals of patriotism. Thus, History links the present with the past, and enables us to see behind the humdrum circumstances of daily life, the toil of centuries, and the work of multitudes of human beings.

It is no doubt true that History in this sense cannot be taught at all to very little children. Probably in most elementary schools up to Standard III., and in many such schools up to Standard IV., children are, as yet, little interested in community life, and have small power to trace development. Even from Standards IV. to VII., and in the middle forms of secondary schools, the amount of History in this sense which can be taught will be limited. But all the so-called History teaching of a school can, at any rate, be preparatory to rousing that attitude to society around, and that sense of the slow growth of accepted facts and institutions, which is called the Historic sense.

Aims.—Out of these considerations arises the second question, viz. why the subject should be taught at all. So much cant may be talked on this question, and one may be so much confused by a multiplicity of suggested aims, that it is very important for each teacher to make up his own mind as to why he is going to teach the subject. For without such a guiding clue he is certain to flounder in selecting his subject-matter, or to relapse into Chronology.

For very small children in the preparatory stage, two or three considerations should be borne in mind. For purposes of future History-study, and also in after life as educated human beings, they will need, first, power to imagine circumstances and conditions other than their own; second, keen sympathy with people they have never seen; and third, a sense of time. All these things are but very slightly developed in little children, and the poorer their circumstances and the narrower their lives, the more undeveloped in these three respects will they be. In many elementary schools, whether placed in the country or in the slums of big cities, the children seldom leave their own narrow surroundings. They can with difficulty picture anything they have not seen. In many schools in big cities, again, the parents live from hand to mouth, and often do not look more than a week ahead; they shift from house to house every few months, and have few settled belongings, and thus the children have few of the associations which help to build up a sense of time. The teacher of History, in such schools as these, who succeeds in training sympathy, imagination, and a time-sense

will have done something to build up that wholesome ambition and that sense of futurity which are necessary to check the growth of the casual class so prolific in the slums of big cities. But with little children of a higher class these three aims are no less important. The power to sympathise with people in strange and remote conditions, the power to realise what those conditions really mean, are essential to the future citizens of a vast self-governing Empire, since national conscience depends to a large extent on just these qualities. A sense of the immensity of time, again, is essential to good citizenship, since it underlies both the reverence for the past, and the hopefulness for the future, which are the two essentials in the British conception of progress.

Thus, even if children were to leave school from Standard III., or from the preparatory forms of secondary schools, the History stories of the first few years might accomplish much. But from the age of about eleven years onwards the special aims of teaching History come more to the fore. Children of this age begin to be conscious of the community-life around them, and the purpose of History-teaching at this stage should be to stimulate this observation, and to explain the facts, by connecting them with preceding conditions in the historic past. At first children are most interested in the social and economic aspects of the community life around them ; they become conscious of their own family as a unit in society, dependent on the community for food, clothing, housing ; they realise the contributions of the breadwinners and of the money-spenders of the family to this community life. For these reasons, in recent years in America, and to a certain extent in England, it has been recognised that social and economic history very simply taught, and immediately following the stage of pure story-telling in History, will arouse great interest and thought in the minds of children. By showing them, for example, how the primitive Saxon clothed, fed, and housed himself, and how through successive centuries these activities have developed with the complexity of society, History lights up for children their everyday life with a world of new meaning, and they recognise that they, too, are links in a chain of development. It is not necessary or desirable in the pursuit of this aim to eliminate from the History-lesson the dramatic interest which is only built

up round great human personalities. We need to train children not merely to observe, but to explain. As far as younger children can understand, the great causes which have moulded History are purely the forces of individual personality; History to them is all hero-worship, and the study of social and economic history is far more convincing to them if shown as the background to the work of such good or bad men as Agricola, Augustine, Alfred, William I., or John, than as the result of impersonal forces. After a year or two of such work the teacher may aim to direct the children's interest to the simple facts of government in the world around them. In Standards VI. or VII., or in the middle forms of secondary schools, such common facts as the income-tax, the tea duty, the parliamentary register, the territorials, can be utilised as the starting-point for questions as to how we are governed, taxed, and defended, and how our forefathers governed, taxed, and defended themselves. Here, again, the simple constitutional history should be treated from the dramatic and biographical point of view. For example, the history of Party can be made clear as a guiding thread in the life-stories of Walpole, Chatham, and the younger Pitt. Thus a main aim of teaching History at this middle stage may be to stimulate observation with a view to studying causation in human affairs. Many teachers, however, will prefer to set before themselves throughout this middle stage the original aim of merely rousing imagination and sympathy. In secondary schools with much time ahead this stage can be more easily prolonged than in elementary schools. One has to face the fact that unless the bulk of the children in the latter schools are interested in the history of their economic and constitutional surroundings now, they will never have the chance again; whereas an interest once fully aroused may, in these days of cheap books, free libraries, and extension lectures, go with them through life. The merely emotional interest in the dramatic side of History, on the other hand, if it stands alone, will probably evaporate directly these children, at thirteen and fourteen years of age, leave school.

Another aim of History-teaching, applicable mainly to older pupils and to secondary schools, is to show the value of evidence in human affairs. Children may learn the uncertainty of con-

clusions based on purely verbal or ocular evidence, though given with the best will in the world; for example, they may learn that an honest contemporary eyewitness of events may be refuted by archæological remains, or contradicted by other eyewitnesses equally honest. Thus they learn caution in accepting statements of fact in personal and political life.

As far as the middle stage of school life goes—a stage which is usually final for the elementary school child—such aims as these are all that can reasonably be adopted. In secondary schools, however, in the higher forms, as the pupils' minds mature, the teacher can set a new aim before himself. The great causes which underlie History properly so-called are such impersonal forces as geographical environment, growth of population, spiritual and intellectual ideas and ideals—these are the forces which sweep aside individual purposes or mould them to their will; even a Savonarola or a Cromwell will fail in so far as he is not in league with these. To trace these causes without hasty generalisation needs the long training of years, and such training can only be begun at school. But it is most important that it should be begun; for whether in relation to the past, the present, or the future, sound judgment in relation to nations and societies is impossible without it. The habit of caution and careful judgment, if once engendered, is likely to be developed in after life.

Lastly, throughout the school life, whether or no the teacher is conscious of it, History is bound to affect the moral conceptions of children, simply because it deals with the relations of men to each other. When all is said and done, the strongest forces underlying History are moral and spiritual forces. Little children will unconsciously adopt into their moral code qualities, good, bad, and indifferent, which they have admired in the lives of the great. Older pupils again may be permanently biassed in their outlook on human life by a one-sided and materialistic presentment of History. It is essential, therefore, for teachers to give some thought to this aspect of the question. In the choice of biographies for little children it is well to remember that courage, courtesy, dogged determination, healthy energy, self-sacrifice, are qualities which they understand and admire. The charge of the Light Brigade, a case of reckless obedience,

is a suitable story at this stage; that of Nelson's blind eye, a case of discriminating disobedience, should be told later, when they can appreciate a conflict of duties; and that of Guy Fawkes only when they can admire a misguided heroism. As children grow older, tolerance and fair-mindedness, respect for the value of quiet, unrecognised work, for loyalty to ideals, for patriotism which is not jingoism, should be the natural outcome of History teaching. With the more advanced pupils in Secondary Schools the study of such movements as Mohammedanism, the Conversion to Christianity, Monasticism, the Crusades, Colonisation, may form an illuminating study in the complexity of human motives as exhibited in the life of whole communities. Above all it is the function of History to develop the type of public-spirit which comes from a realisation that "man," as Aristotle has it, "is a political animal," and as such has duties as well as rights in relation to the community. The last word in connection with the moral aspect of History teaching is that the teacher must never moralise. Given a right selection of subject-matter, History can be left to play its own part in moral training.

Selection of Subject-Matter.—The next great problem is that of selection of subject-matter. In spite of the immense field of choice open to teachers, it is not too much to say that one of the greatest causes of bad History-teaching has been the slavish adherence to a certain orthodox canon of "what every one ought to know" in History. This is due not entirely to the tyranny of examiners, but partly to the conservatism of teachers, and to text-books. For example, the Wars of Marlborough are much more generally studied in the history of the eighteenth century than the story of the Industrial Revolution; most people teach the Wars of the Roses, few people tell the history of the fifteenth-century towns, or show the significance of Dick Whittington; while for little children such stories as the Wreck of the White Ship, the Murder of Becket, the Black Hole of Calcutta, have a quite inexplicable prominence in many school syllabuses.

The intelligent planning of a school History syllabus, with adequate selection for the work of each year, is the first and indispensable step towards realising one's aims. Certain conditions should always be borne in mind in making such selection.

First, one should consider the characteristics of the neighbourhood in which the school is placed—whether it be in country or in town, whether by the sea or inland, whether it be a manufacturing or commercial centre, a sleepy residential quarter, or an old cathedral or county town of the South. Again, the family circumstances of the majority of the children should be reckoned with—whether the parents are agricultural labourers or unskilled workers or of the casual working class, whether they are skilled artisans, railway operatives, clerks, tradespeople, farmers, fishermen, merchants, or professional men. In the elementary schools in big cities it will often be found that one such class predominates in a given school, and such broad divisions are not unknown in secondary schools also. All such circumstances as these are of first-rate importance, since on them will depend the children's outlook on the world around, and the mental conceptions on which effective History-teaching must be based. A child living on the moorlands of Derbyshire, another child in a cotton town in Lancashire, a third in Rotherhithe, and a fourth in Deal, would necessarily approach History through very different channels of thought, although ultimately they should share in common a knowledge of the broad lines of national history. Thirdly, the children's age is a criterion ; and lastly, their probable future career, whether they are to leave at thirteen or fourteen years of age and go at once to manual labour, or are to stay at school till seventeen or eighteen years of age, and possibly to go on to college.

With this proviso one may, for convenience' sake, roughly group together for consideration : (*a*) Standards I., II. and III. in the Elementary School, and the Lower or Preparatory Forms in the Secondary School ; (*b*) Standards IV., V., VI., and VII. in the Elementary School and the Middle Forms in the Secondary School ; (*c*) the Upper Forms in the Secondary School. This is justifiable in spite of the disparity in age between the children in elementary and secondary schools thus grouped together, since the fact that elementary school children leave so young makes it necessary to teach them aspects of the subject which ideally should be deferred for a year or two.

(1) In the preparatory stage it is usually found best to observe

the following points. Biographical stories, dramatically told, appeal most to little children, because their world is a world of individuals, not of groups, and a world of heroes who do doughty deeds. Secondly, with very little children, *e.g.* in Standard I., stories from the childhood of the race are the most effective, because children's social ideas resemble those of simple and primitive men. They can understand how Horatius kept the Bridge better than how Wellington won Waterloo, and they have more sympathy with Pheidippides, Hereward, or Boadicea, than they have with Oliver Cromwell or with Queen Victoria. Again, the stories selected should exhibit qualities and motives which children can understand: thus the stories of Thomas à Becket, and Wolsey, are above their comprehension, and Edward VI. is a mawkish personality whom they scarcely appreciate. They like simple, obvious motives, and vigorous, healthy action, in their heroes. Pure unrelieved tragedy, again, such as Prince Arthur, or the Princes in the Tower, is probably unsuitable at this stage. Lastly, their sense of time is not very strong, and so true is this with children of Standard I. that "Long, long ago," and "Once upon a time" are as much as they can be expected to understand. But with children in Standards II. and III. it becomes important so to select and arrange the stories that a continuous idea of time is built up in their minds. Thus, very little children can range through stories mythical and non-mythical, drawn from Greece and Rome, Mediæval Europe and Saxon England. But children in Standards II. and III. ought to understand the relative position of the stories in time, and the selection should, therefore, be made more strictly on chronological lines.

(2) With the middle stage, History-teaching properly so-called begins. A new set of problems now arises. First there is the question whether only English History is to be taught, or whether there is to be any European History. In elementary schools the latter, as a separate subject, is usually found impracticable, owing to lack of time. But, at the same time, to check insularity, those European movements which form an integral part of English History can be treated from a wider standpoint than is often done. Thus, the Roman Empire, the coming of the Northmen, the Crusades, the struggle of the King

with the Pope in the Middle Ages, the beginnings of colonisation, the Reformation, and similar movements, should undoubtedly be shown in relation to Europe as a whole. In secondary schools, on the other hand, it is often found advisable to drop English History altogether for a year or two, between the ages of about twelve and fourteen, for the sake of European History. The advantages urged are that English History is subsequently studied more intelligently and in better perspective, that children return to it with greater zest after dropping it for two years, and that an elementary knowledge of European History facilitates correlation with geography and with literature.

The next problem is whether to treat English History in periods, or on the "concentric" plan. By the latter plan, the whole course of English History is rapidly covered each year in succession, stress being usually laid on a slightly different selection of facts each year. It is thought by those who advocate this plan that a clear and broad framework of knowledge is riveted in the mind by thus passing several times over the same ground. In elementary schools there is the additional point that, owing to uncertainty in parents' work, children shift frequently from school to school, and, moreover, by reaching the age-limit in Standard V., often never reach the highest standards at all; by the concentric plan they do at any rate follow a connected course of English History. The objection is that the treatment is necessarily so hurried that there is insufficient time each year to get closely into touch with any part of the subject, and thus the appeal is almost inevitably to memory rather than to intelligence. In fact the "History" becomes merely chronology. The alternative plan is to divide English Political History into several periods, and to take one period each year. This secures greater vividness, and leaves time for the concrete detail and the interconnection of events, on which an intelligent study of History depends. On the other hand, in elementary schools, because of the shifting from school to school, and the fact that a majority leave altogether from Standard V., large numbers by this plan never get a connected course, and fail to see the meaning of History altogether. A possible solution of these difficulties is a combined concentric and periodic treatment, whereby the

course of English History is covered once every two years; thus Standard IV. might reach the year 1485, and Standard V. study from 1485 to the present day. If this is done, a selection may be made in the first two years of the social and economic aspects of national history as a background for the main thread of the story, and similarly in the second two years the aspect of government may be stressed. The special details of selection should vary with the school conditions. Thus, the Wars of the Roses might be taken with Standard IV. in a country school, not as a gloomy catalogue of battles, or merely as the life-history of a few leading men, but from the point of view of their effect on the life of a village at the time. Warwick the Kingmaker need not be omitted, but he might be shown as a great feudal noble, drawing rents from countless villages, banqueting daily on oxen, sheep, and capons which village people had reared, and exposing stout village knaves to slaughter by making them his liveried followers. Similarly in a town school, the effect of the Wars on town life might be considered. In the second two years, beginning with Standard VI., the same subject might be treated from the governmental point of view, to show the miseries of ordinary Englishmen when the King was weak, and when men like the Kingmaker could interfere with law-courts and parliamentary elections, and make the sheriffs their tools.

An additional problem in selection, which belongs to this middle stage, is that of teaching local history. It is almost universally agreed that some local history should be taught; materials can always be found, whether in the new manufacturing towns of the North, in the older towns of the South, or in the villages. The problem at issue is whether to teach it as a separate branch of the subject, or only to use it in illustration of the general English History. If time can be spared for separate treatment, a few weeks or even a term devoted entirely to the local history of the neighbourhood is of immense value, as it gives a sense of reality to all subsequent History study. But the great value of local history is that it affords concrete examples of the main facts of English History; throughout the school course, teachers should be on the watch for local illustration whether by archæological remains, place-names, local customs, or other survivals.

Thus London children should study their monasteries by means of Westminster Abbey, their castles by means of the Tower, their social life by means of houses, streets, and place-names still surviving.

The last problem in selection for this part of the course is whether to teach Civics as a separate branch. Here, again, in elementary schools there is scarcely time, without sacrificing more important work. It is also probably far better to endeavour throughout the last two years of the course to interest the children in modern institutions by tracing their history, than to give separate lessons on those institutions divorced from History. In the middle forms of secondary schools, on the other hand, where the children learn more at home, and go about more and have more time ahead, an hour a week for a year can well be spared for the examination and discussion of the broad facts underlying civic duty and responsibility. Here, as in the case of European History, it will be found that this study will react favourably on the subsequent work in English History. It is important nowadays that such a course should deal with the Empire as a whole, and not be limited to questions of home government; and it must be remembered that in a subject like this, the whole is intelligible before the part, and thus that the attempt to approach Civics through the study of Local Government will probably end in failure.

(3) The questions of selection for the upper forms of secondary schools usually settle themselves, owing to the demands of examinations and scholarships. Where, however, choice is unfettered, and a good groundwork has been laid, the question of selection connects itself mainly with the question of aim. If one wishes to exhibit the great impersonal forces and movements of History, it is essential to choose a field on which they can be studied as a whole. In the greater movements of history the continent of Europe is one vast community, dominated by the same broad racial, geographical, intellectual and spiritual conditions. It is very advisable, therefore, to spend some considerable time at this stage in studying European History as a whole, and in tracing the rise of the great institutions and movements which have characterised it. European History in this sense begins

with Greek History, develops into that of the Roman Empire, and the mediæval Empire and Papacy; mediæval Europe finds its characteristic movements in the Crusades, the inland trade and the growth of free towns, the monastic, Franciscan, and other similar movements. The transition to modern History comes with the Renaissance, with exploration and colonisation, with the Reformation, and with the rise of independent and rival nations. Lastly, there follow such movements as the industrial and agrarian revolutions, and the French Revolution, leading on to the movements of the present day. Two or three years given to a course such as this, in which Europe was considered as a whole, would go far to remove the reproach of insularity from our History-teaching. The plan is more educative than the isolated study of the history of single countries, such as France. Coupled with this, however, the close and detailed study of one small aspect or period of English History is advisable. A wide sweep of general history does not give sufficient opportunity for training in the use of books, for weighing evidence, or for the formation of independent opinion, to be wholly satisfactory without some such supplementary course. It is in the detailed study of a single period, such as the Commonwealth and Protectorate, that pupils gain an intimate sense of the reality of History.

Method.—The realisation of a teacher's aims in History-teaching depends partly on selection of adequate subject-matter, but it depends also very largely on the methods whereby the subject is taught. Here the root-problem is that of making children think for themselves, and not merely absorb passively the results of other people's work. Two special dangers beset the teacher—the old-fashioned danger that children will merely learn by heart the dead statements of text-books, and the more modern danger that children, though delighted to sit and listen to picturesque descriptions by the teacher, will be utterly unable, when left to themselves, to make mental pictures, to use books, or to draw conclusions from facts.

The latter is a fault on the right side. Delight in listening to description and narrative is an index that the mind is awake and active, that the imagination is busy with a world of its own; even the trained historian needs imagination as an indispensable

part of his equipment. It is only when History stops short at this point, and affords no other training to children, that such a method is positively harmful. History, in fact, as a means of mental training, begins with the cultivation of the imagination; the first problem in Method is how to cultivate it. Other problems in securing mental discipline will be subsequently considered, under the heads of training in observation, training in self-expression, and in the use of books, the development of the sense of time, and the training in judgment and reasoning.

1. Cultivation of the Imagination

A great mistake is often made by teachers who think it essential that children, in season and out of season, should constantly be answering questions, and who conscientiously interrupt the thread of history stories to stir up the children in this way. With very little children a show of uplifted hands is by no means the surest sign of genuine mental activity, and the class of little people who will sit in breathless silence through a story lasting for a quarter of an hour or twenty minutes, undoubtedly does some very hard thinking. The question is how to get this breathless attention from small people. The poorer their homes, the more narrow their outlook, the more difficult it becomes to build the mental pictures in their little vacant minds. The first essential is to realise what is likely to be in their minds already: it is useless to talk of forests, and seas, and knights, and castles to people who have only seen London streets: only gradually can these notions be introduced. The second essential is dramatic simplicity in the plot; and this is the case with all children, whatever their lot. As in the classical drama of old, there must be one theme working up to a climax at the end; if possible, there must be only one principal actor; and the incidents of the story must be few and vivid. Thirdly, there must usually be plenty of concrete detail of the kind they can understand: houses, dress, weapons, and sometimes scenery, must be accurately described. All children do not need such detail, but very many do. Actual pictures should be freely but discriminatingly used; they are necessary where the details of the scene cannot be made clear

by description, as is the case with objects which children have never seen; but they lead to idleness if used merely to tickle the fancy, or to save children the trouble of thinking. The common practice of testing attention to such a story by making some child repeat it orally to the class is of doubtful value. Little children have such slight command of language that their halting efforts to relate the story are no gauge of what they have grasped, and the class is dragged down from the wonderland of imagination in which the teacher has placed it, to the sordid facts of schoolroom discipline.

The training of imagination thus begun should be carried through the school course, even through the highest forms in secondary schools. But the children should be trained to use their own imaginative powers more as time goes on. Pictures should gradually be more sparingly used, and merely to give necessary details such as armour or dress, never to depict whole scenes. The teacher should sometimes avoid giving a description, and merely give the necessary facts, in order that the children may construct the scene. Thus, if children knew the recorded facts of the Viking invasions, and the necessary social details, they might be asked to describe a Viking raid from the point of view of an eyewitness. This kind of training, however, brings us to the second problem of method.

2. Training of Observation

The most vivid ideas of the past are based on observation of the present. To see a single ancient building or handle one old axe-head, is worth a world of description. But not only so. The spirit of the past is bound up with the present: to observe with attention the social, economic, and governmental institutions which affect our lives is the first step to realising the conditions out of which they arose. Here, then, is a fruitful field for independent work on the part of children. Questions may be set about some old house, some old street-name, or some old market, questions which can not be answered from books, and which they must personally investigate. Again, they may be sent to ask their parents about income-tax, or the parliamentary

franchise ; they may watch the doings of the postman. They can be sent to visit museums, and to sketch objects seen, or they can be given problems to solve from the excellent photographic reproductions of old buildings or other remains to be found in so many cheap history books. The essential thing is that they shall learn, not idly to gaze, but to find answers to questions by using their eyes. On this condition depends the value of expeditions to places of historic interest. To take a class of children aimlessly round Westminster Abbey is of small value ; but let that class observe the cloisters, and afterwards describe some cloister scene of old monastic days, and the children will look to some purpose ; or tell them to find out the difference between the ground plan of the Abbey Church and that of an ordinary parish church, and then explain to them the reasons for the difference, and the visit will set them thinking.

3. Training in Self-Expression

With very little children, as already remarked, teachers will be wise not to insist on much oral expression. But many teachers find drawing and painting a great help in connection with History stories. Little children delight in trying to draw a scene, and the crudest productions are often very illuminating to the teacher. For example, the child who drew Alfred baking cakes on a gas-stove had still something to learn about that ancient story.

In America, other forms of manual work are used in connection with the social and economic history. In some well-known schools the children illustrate each stage of civilisation by making appropriate objects : the rough Indian wigwams, clay pots, matting and rugs made at the first stage, are followed up by a graded series of manual occupations illustrative of the development of civilisation ; and in one case the course is brought down to modern times by the making of machine models by older boys. The difficulty here is that the teacher of manual work is not always an enthusiast for History, or ready to subordinate his course to the needs of the History teacher ; but a good deal might be done in a simple way with little children

in English schools, in cases where the same teacher takes both subjects.

Another form of self-expression is "dramatised history"; children are sometimes taught to act scenes from History. This needs to be carefully done, with accurate detail in dress, manners, and customs, otherwise it will be valueless.

As children grow older written work comes into play as a means of historical training. The point here is to avoid mere reproduction of facts remembered. From Standard IV. onwards children can construct pieces of imaginative work; for example, they may write a letter from a soldier on the Roman Wall describing his life, or may give the account of an eyewitness of the Battle of Hastings. Here, again, most careful attention must be paid to accurate detail. It will often be found that misconceptions show themselves in such work which might otherwise have escaped the teacher's notice. Children delight in writing such answers; the practice leads to hard thinking, and gives them a keen realisation of the period which they are studying.

With the oldest pupils in secondary schools, ordinary essay writing is of course invaluable. But another very valuable form of self-expression is afforded by class debates or discussions on points in which marked difference of opinion is possible. Pupils may be assigned one of two sides in such questions as the wisdom of Elizabeth's church policy, the responsibility of Wolsey or Henry VIII. for the foreign relations of the reign, the influence of Wentworth on Ireland, the influence of Walpole on England. The adoption of the regular debating form arouses the keenest interest, especially if a vote is taken at the end.

Lastly, in studying constitutional History, dramatisation is often useful. For example, to act a Saxon trial by ordeal or compurgation, and follow it up with a modern trial by jury, will at once make the differences real; again, the old-fashioned open election, and the modern election by ballot can similarly be contrasted, and many other constitutional points will easily suggest themselves.

4. Training in a Sense of Time

Closely connected with the training of imagination and of self-expression is the training in a sense of time. The old-fashioned method was to set children to learn dates. In the reaction against this mechanical exercise, the sense of time is too often left to look after itself. Yet, unless children gain a clear idea of time-relations, relations of cause and effect are apt to be hazy. Even the learning by heart of the names and dates of the kings of England has its part to play in the study of English History, just as the learning of Greek verbs has in the study of Greek Literature. What was bad about the old-fashioned learning of dates was that the memory relied not on any intelligible idea or mental picture, but on a jingle of words, a mistake exactly similar to the old-fashioned method of learning the multiplication table. Most people who have clear ideas of time carry in their minds a mental chart representing its course ; and though many people do not thus visualise time, it is very advisable to train children to do so. This is done by the use of " time-charts." Every class-room should have a long continuous strip vertically or horizontally attached to the walls, to represent the course of time, visible to all in the class, and showing clearly and accurately the divisions of centuries, decades, and, if possible, of years. It should be manufactured in the school, and should be filled up gradually as the course proceeds. With younger children the period of time in which their own studies are comprised can thus be treated; *e.g.* a chart of the centuries of the Christian era may be sufficient. But with older children it is advisable to have a supplementary chart on a different scale, showing the whole course of historic time, and making clear the relatively small proportion occupied by our era, or by the period which the class are actually studying. The learning of dates will become perfectly easy if events as they occur are marked on this chart ; and children will be familiar with the relations in time of events in European and in English History, and will gain some notion of what very small people we all are. More mature pupils should be trained to make their own private charts as the course proceeds.

5. Training in the Use of Books

Children should learn to use history books for three reasons. First, they need a general summary, useful to prevent confusion of mind; in other words, they need a text-book. But they need also to be trained to read more attractive books than text-books for the pleasure of doing so. Lastly, they need to use larger books for reference.

With little children the use of books in History is much more often harmful than helpful. Unless books can be supplied which they will read with zest, the books merely choke interest. The best existing books for little children depend for their charm far more on pictures than on letterpress.

The question of books becomes important in elementary schools at about Standard IV. The main value of the text-book is to avoid the necessity of dictating notes, and thus to save time more profitably spent in other ways. The text-book chosen should, therefore, be clear and fairly brief; it should be suitable for use in the whole middle stage, *i.e.* from Standards IV. to VII., since it will naturally serve as a framework for ideas; and it should also be cheap, in order that children may have in their hands other and more genuine history books. For now arises the consideration that in after life children will continue to study History only if they have learned to love and use the books. But no one can love a text-book, with its cut-and-dried arrangement, its broad and generalised statements, its lack of concrete detail and dramatic presentation, its inhuman style. There is need of more books for children, not written in a style which no grown-up person would tolerate for a moment. Books of a more stimulating kind are occasionally to be found among the best of the many series of so-called Historical Readers for schools. They should, of course, never be used for oral reading, but for private study only. Children can be set to cull material for written work or class discussion from such books, or to read for sheer pleasure some side aspect not taken up in the lesson.

For work of this kind with older children there are in the field various series of collections of reprints from original sources of History, usually known as "source-books." An account

by an actual contemporary forms fascinating supplementary reading for children Moreover, actual problems can sometimes be set from such source-books. In the upper forms of a secondary school, for example, pupils may be asked to collect from Tacitus' account of the Germans, those statements which suggest that he either saw with Roman eyes, or was studying semi-Romanised tribes; or they may draw up a comparison and contrast between Henry I.'s Charter and the published extracts from that of John. Further, there is an ever-increasing number of cheap reprints of entire books written in the sixteenth, seventeenth, and eighteenth centuries; for example, More's *Utopia*, Cavendish's *Life of Wolsey*, Harrison's *Description of England*, culminating with the fascinating account of the visit to England of the German pastor De Moritz in 1782. Such books cost from sixpence to one shilling. Older pupils can be encouraged to buy them with their own money; thus the collector's instinct, which so often goes to seed in children, may be utilised to found small private libraries; and this may grow later into a habit of book-buying, and thus check the vicious modern tendency of only using borrowed or library books.

Lastly, there arises the question of training children to use a library effectively. For this purpose there should be a school library, containing books which children cannot buy; and, if possible, the local free library should be used. In America the more remote schools are, in many States, supplied with libraries by an admirable system of travelling school-libraries; and even in the big cities it is by no means unknown for a big free public library to supply schools with fifty books at a time. In Boston and other cities admirable reading-rooms for children only are attached to the free public libraries, and in some cases librarians co-operate closely with the teachers in showing the children how to use books. Some public libraries in England are beginning to adopt similar methods; and it is probable that if teachers went half-way to meet them, the conservatism of many English librarians might be broken down.

The first step is to teach children to refer to books by use of chapter headings and indexes, and to find what they want without reading through a whole large book. Next they must be shown how to make and arrange notes, and should be trained to keep

references to their authorities. Again, they can be shown how to compare accounts by rival historians and by contemporaries as given in source-books. The practical difficulty, which will at once suggest itself, is that of limitation of copies; it is obviously not easy for a whole class of children to read one book, or even five copies of one book. Excellent work, however, can be done on a co-operative system; a scheme can be drawn up by a teacher covering the whole of a given subject, to be found in a large variety of books, and divided into sections; to each child or small group of children one section can be allotted, with its appropriate reference-books. For example, the growth of the Navy might be so treated, or the development of the House of Commons; or the Commonwealth and Protectorate period might be studied in its effects on social life, on Church life, on the Empire, and on foreign relations. When each pupil has produced either an essay or organised notes on his section, two or three class hours can be given to reading and discussion of the whole subject.

Book-training such as this will have its bearing not merely on the History work of the pupils; it will enable them to use books effectively for any purpose in after life. There might be far more specialisation for pupils in the upper forms of secondary schools if this bearing of method in one subject upon all other subjects were more generally recognised.

6. Training of Judgment and Reasoning

Lastly, the study and grouping of facts prepares the way for drawing conclusions from facts. The first caution here is that it is ridiculous to attempt this with young children. Only to a very limited extent, if at all, can it be begun in elementary schools. Moreover, in this scientific age, it is important to remember that History is a subject in which purely scientific reasoning is liable to lead astray. Unless one adopts a determinist attitude, and holds that men's actions are wholly bound by their conditions, one must be prepared for the unexpected, the incalculable, and the inexplicable in History. Teachers trained in the heuristic method often ask such questions as, "What would the King do now?" or, "What would be the result of that?" Such questions may afford a deliberate training in loose

reasoning based on insufficient data. The incalculable element involved in human nature makes such prophecy worthless, and most classes of children take with zest to the game of guessing.

Nevertheless it is true that, though individuals are swayed by unaccountable influences, great masses of men tend to act in certain ways under certain conditions; and the law of averages allows the historian to neglect the exceptional few who will not so act. Thus, when pupils are old enough to view History as a question of forces, affecting whole communities and producing great movements of progress and change, they are able to attempt the task of drawing conclusions and foreseeing results. It should always be impressed on them, however, that all such reasoning is peculiarly liable to error, since the spiritual factor is largely unknown. For this very reason the training will be all the more valuable, because pupils learn in this way the kind of reasoning which is neither mathematical nor purely scientific, but which is constantly called into play in relation to human affairs, both political and private.

Perhaps the first great motive force which pupils can understand is that of ideas and ideals working on masses of men; they can understand why the Romans came to Britain, what was the influence of Christianity on the social life of the primitive barbarian, what produced the Crusades, or the Puritan uprising, or the Jacobite rebellions. In the next place, children can understand the influence of the steady growth of population upon communities; for example, they can see how it produced on the one hand the Scandinavian inroads, and on the other the industrial revolution. Thirdly, they begin to understand the influence of geography on History. This is more difficult, because it presupposes somewhat broad notions of geography; but as soon as they can conceive of great land masses, with their main physical characteristics, they can trace their influence on human life. Thus, throughout English History the broad structural division of north-western mountain and south-eastern plain, roughly separated by a line drawn from the Bristol Channel to the Humber, is realised as a differentiating force, from the time of the coming of the Romans to the end of the eighteenth century. Again, in the eighteenth-century struggle between France and England

for North America, the possession by the English Colonies of a long and varied sea-board, together with diverse routes into the interior, is seen to give an overwhelming advantage, against Canada, whose only entrance is by the "bottle-neck" of the St. Lawrence estuary.

The motive forces of History are more easily understood by young people if they are to a certain extent isolated for separate study. In the ordinary treatment of the whole political history of a period, so many aspects of national life are simultaneously studied, that the problem of tracing causes becomes exceedingly complex. It is better, therefore, to select for separate treatment various aspects of national life, and to link them up into a composite picture in the form of revision.

The Teacher of History.—One point remains to be touched upon—the teacher's preparation for the work. Undoubtedly a good History teacher must be a specialist, not, however, in the sense necessarily of taking a University degree in the subject, for the lines of study adopted for University courses by no means afford the best preparation for teaching children. But no one can do first-rate work as a History teacher to whom the subject itself is not of absorbing interest, to be cultivated as a hobby in leisure hours, and to be studied year in, year out. Every teacher, therefore, should either beg to be relieved of the subject altogether, or clamour to be allowed to teach a great deal of it and to be freed from other exacting subjects, in order to be able to teach it properly. The objections so often urged in elementary schools against allowing teachers to exchange classes for the purpose of specialising, disappear, as a matter of fact, when the plan is tried, provided that the school is one with good discipline and a good tone. Until such specialisation is made possible, very little real improvement in History-teaching is practicable, since the first essentials of the subject in every school are unity of aim and of scheme throughout the course, and a teacher who is an enthusiastic student of the subject.

Bibliography.—The best bibliographies for teachers of History are contained in various leaflets issued by the Historical Association, and to be obtained of the Secretary, Miss M. B. Curran, 6, South Square, Gray's Inn.

VI

EDUCATIONAL HANDWORK

Its Importance for Intellectual and Moral as well as Physical Training

By Henry G. Paterson

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What is Education?—Pestalozzi defines education as "the generation of power," and a commentator has well remarked, "What kind of power? Not merely power to think abstractly, to speculate, to moralise, to philosophise, but power to act intelligently; and the power to act intelligently involves the exertion in a greater or less degree of all the powers both mental and physical." It is now practically admitted that in a sound educational system there must be a co-ordination of manual dexterity and mental powers. This conviction has led to the introduction by educational authorities of what has been termed Manual Instruction.

Manual Instruction or Educational Handwork?—It would be well here to start with a clear idea of what is meant by this term "Manual Instruction." A better term would be "Manual Training," as instruction may be defined as "that part of education which furnishes the mind with knowledge," *i.e.* technical knowledge; while training is a department of education in which "the chief element is exercise or practice for the purpose of imparting facility in any physical or mental operation." "Training" suits the modern conception of the work better than the term "Instruction." If then the word "Instruction" be dropped owing to its technical flavour, the word "Manual" should also, because of its suggestion of industrial activity, be superseded by

the simpler and more appropriate expression "Hand." "Hand Training" or "Educational Handwork" seems most accurately to describe the method of education under discussion.

Educational Handwork a Method, not a Subject.—Educational Handwork, properly conceived, is not a subject, but a method of teaching many of the existing subjects. It is a means of leading out the faculties, and so enabling the pupil to acquire and assimilate knowledge in a way not to be obtained by didactic teaching. It is the inculcation of self-help, of seeing and believing, of demonstrating. It enables the child to follow up his reasoning processes and put them to the proof, to take abstract theorems and convert them into tangible realities.

Object of Educational Handwork.—The primary object of Educational Handwork is not the mere acquiring of manual dexterity, but rather the acquisition of a mental and moral equipment. It is a training *by*, not in, the use of tools. Every operation is thoughtfully directed, every calculation carefully made. Here mistakes are not made with impunity, because once made they remain. Absolute conformity to pattern, strict truthfulness of detail, are the goals to which the pupil must aspire. In other words, neatness of arrangement and order of execution are essentials to good work; while accuracy, which is simply truthfulness, stands as the supreme test of all. Moreover, in Handwork "the incentive to emulation is visibly operative, the slow worker stands by his brisker comrade and learns to imitate him; the teacher has no need to drive, the work itself is impulse enough." Again, the general instruction provided in school is of necessity largely class instruction; the teacher can only question one pupil at a time, and the dull boy is prone to give himself a rest. The handwork tasks on the contrary are individual performances. Here the loose thinker cannot have the thinking done for him, nor can he hide his sloth under a neighbour's zeal. The work lies before the pupil, and he must put forth his own effort to do it. No school subject is worthy of a place in the school curriculum unless it is capable of being afterwards linked to the subsequent activities and actions of life. Much that passes for education has to be dropped as soon as the pupil leaves school. Not so with the tendency and power which this training gives.

Its power will be an aid at every turn, and its tendency towards the good and the true will raise the tone of the ensuing life-work.

The Beginnings of Handwork—The Kindergarten

The Foundation of Educational Handwork.—While there is much in the initial stages of school life relating to songs and stories, gifts and games, covered by the term "Kindergarten Work," which have only an indirect connection with Educational Handwork, the ensuing developments of this educational method, namely the "occupations," mark the beginnings of constructive education. Of the importance of these beginnings it is impossible to think too highly. In this respect it is to be feared that many teachers are tempted to look upon the *occupation hour* as the *teacher's hour*, when the children are provided with a piece of clay and left to their own sweet will to fashion and form it as they please—left to see their own visions, dream their own dreams and give concrete expression to their own ideas. The child's free *expressional* lesson should provide the teacher's opportunity for a lasting *impressional* lesson. What of the finished model? Rubbish to the outsider, a source of interest and sometimes even inspiration to the teacher, a treasured possession to the little one whose brain and fingers have created it, and who only awaits the teacher's invitation to weave round it a story which will provide admirable insight into child nature at first hand. Thus often unconsciously is performed the great work of laying the foundation upon which the superstructure of Educational Handwork, and education generally in its more developed forms, is in after years to be reared. Upon the careful methodical procedure of the work at this stage of the pupil's career depends largely his ultimate power of conception and execution.

The Gap in Constructive Education between the Infant and Senior Divisions of the School, and how to Bridge it

Ample time is usually provided for the vitalising of a child's ideas by Handwork occupations in the infant departments of our schools. These generally extend through the two first years of a child's school career, *i.e.* from the age of five to seven years.

At the age of eleven or twelve the boys are drafted into the woodwork class-room for an average period of two hours per week. The intervening years, between the ages of seven and eleven or twelve, are in most schools left wholly unprovided for, as far as Educational Handwork goes. This is where the system of practical education has completely broken down in the past. If this form of education is good for a child at the beginning of school life, and during the closing years of study, it must reasonably be assumed to be equally good and valuable in the intermediate classes.

Unquestionably the most clamant need in our methods of Education to-day, therefore, is the filling up of this gap between the Kindergarten work of the infant department and the Handwork of the upper classes.

Obstacles to Bridging the Gap

The obstacles which have hitherto impeded the extension of the Handwork scheme as taught in the infant classes to the junior division of the school, are the pleas that :

1. The ground has already been covered, and sufficient time having already been devoted to this method, the pupils must now be initiated into the real work of the school.

2. The classes are too large for the effective teaching of Handwork.

3. The equipment and accommodation in most schools are unsuitable.

4. The ordinary members of the teaching staff are as a rule inexperienced in the teaching of the various forms of Handwork.

In the first place, the ground has not been already covered. The years in the infant room have been merely years of preparation, but the training given during that period is fitted, if continued, to lead to full fruition. The department of his nature which was being cultivated by the practical " occupations " still requires similar cultivation by a judicious continuance of practical work.

The second objection states a real difficulty, but it is one which is being gradually removed. The requirements of the educational

authorities are becoming more imperative in regard to reduction in the size of classes, and the inclusion of Handwork in the curriculum would render this reform obligatory.

As regards the third objection, courses of work in Paper and Cardboard, admirably suited for execution at the ordinary school desk, are now within the reach of teachers. School furniture and appliances are continually being made on more approved lines, and the adoption of these is merely a question of convincing the authorities of the necessity for a better equipment.

In dealing with the last objection, the inexperience of the teacher, ample facility is now provided both at home and abroad, by means of holiday courses and vacation classes for the acquisition by the teacher of a knowledge of Handwork methods in the various materials. There is, therefore, now every reason to hope for the early bridging of this undesirable gap in Educational Handwork between the infant department and the senior classes of our schools.

Materials Employed—Advantages of Variety in Material

In the early years of this movement "Manual Training" and "Woodwork" were practically synonymous terms, and this was due mainly to the fact that Finland and Sweden, the pioneers in the Handwork movement, began by using their own natural resources as a medium of training. While admitting the splendid facilities afforded by woodwork for training the hand and the eye, yet we must realise that a training in this medium alone can only result in the development of some of the faculties. A course of instruction in wood, with the accuracy and precision peculiar to that medium, requires the correcting influence of work in other materials to produce the best possible results in a training of the mental activities. Again, in designing work with a variety of materials at our disposal, we can study the capabilities of the medium, and the effects which it can best yield. For example, in rendering thin foliage, open scroll-work, or other ornamental work where lightness and strength are both required, metal would be the best medium of expression, while masses such as fruit and objects of free outline would be most effectively

rendered in clay. Straight-line objects would be best executed in cardboard or wood; so that each medium has its own place in a well-ordered scheme of Handwork. It is a recognised fact that whenever the processes capable of being carried out in any one material come to be executed by a child in a mechanical fashion, work in that material treated separately has ceased to be an educative factor for that pupil, but if that material is combined with another a fresh field of activity is opened up. This employment of a variety of materials permits of the utilisation of that type of Handwork which is by far the most educative—viz. the production of the composite model.

Rules for the Selection of Materials.—The following simple rules should be observed in the selection of materials for schemes of Handwork.

1. Materials selected for primary classes must be capable of easy and speedy manipulation, because of the little fingers which have to fashion them, and owing to the shortness of the lessons which can be given at this stage.

2. Any material selected for a course of work, while being specially suitable for the stage for which it is chosen, should also lend itself to future application throughout the successive schemes.

3. As far as possible the materials selected should be such as children are familiar with and such as can be easily procured by them for work at home. The materials suggested for a progressive scheme of work are as follows: Paper, Clay, Raffia, Cane, Cardboard, Wood, and Metal. In country schools raffia and cane may be replaced by grasses and willows when procurable, and plasticine may be substituted for clay when conditions will not permit of the use of the latter.

The Correlation of Handwork with other School Subjects

As has already been pointed out, Educational Handwork is a method rather than a subject of instruction, and as such it can only perform its true function when correlated with the general subjects of the school curriculum.

Drawing.—The correlation of Handwork with Drawing and other forms of Art is probably best exemplified in Clay Modelling,

which is simply the rendering of form in the solid. It has this advantage over the other methods of representation—by pencil, pen or brush—that, whereas by these the object can only be represented as seen from one point of view, in modelling, save in low-relief work, the object is looked at from all sides. (See illustrations, memory studies in clay.) Further, by means of paper-work, the children of the infant classes are enabled to provide themselves individually with drawing-models eminently suitable for their stage of advancement. (See illustrations, paper-tearing course.) The senior pupils in the same way may utilise the models in the Cardboard course as their own drawing-models or construct them on a large scale for class models. Nor should the association of these two branches of practical education stop here. The designing of the outlines of the Handwork models for the senior classes in wood and metal provides an excellent opportunity for a practical application of the drawing lesson. When the stage for Mechanical drawing has been reached, it is one of the essentials of a good model that it is capable of providing a good drawing lesson.

Arithmetic.—Arithmetic and Handwork may be associated more or less from the primary classes upwards. It is quite obvious how the paper-folding exercises may be connected with the number lessons in the infant department, while later, in addition to furnishing data for numerous exercises in measurements, estimating quantities in material, time and cost of production, many a problem regarding areas and cubic measurements may be made plain, and many an abstract theorem hard to accept will find visual proof by association with Handwork.

Geography.—Geography is another subject that may be aided by Handwork. For young pupils the most interesting and natural way to acquire an efficient knowledge of geographical definitions, *e.g.* hill, valley, cape, etc., is to fashion the several physical features with moist sand or clay. With older pupils an accurate and lasting impression of the prominent physical features in any district is best formed and retained by pupils making models of them in clay or cardboard, either roughly from observation, or accurately and to scale from Survey maps.

Type of Handwork Regulated and Influenced by Circumstances

"What shall we give our children to do?" is a question often put by the teacher to the Handwork expert. The best answer is, "Let them follow the path of natural interest, and wherever possible let them make the things that if left to themselves they would naturally make." These may be in any of the media already specified, or they may be in some entirely different material. The type of Handwork should be largely influenced by circumstances, and no teacher worthy of the name will ever dream of following year in, year out, the same prescribed course. The circumstances of a country may determine the type of Handwork, as in the case of a mission school on the West Coast of Africa, where tailoring is the most popular item on the curriculum. The scheme which will be outlined in this article will be comprehensive enough to suit most schools and conditions, but the accommodation or equipment at the disposal of the teacher, the fact whether the school is a town or country school, the question of the prevailing local industries, may all have a share in determining the selection. This statement may be open to misconception, because many people who object to Handwork do so on the ground of its being merely utilitarian, and an example of undesirable specialising in education. The selection indicated, however, should not be made with a view to the boy's future work, but rather with regard to his natural surroundings, and what he sees going on around him; just as the teacher would make special use of local history and antiquities to stimulate and create interest in the history lesson and render it more easily intelligible.

A Graduated Scheme of Handwork Occupations

If we follow the path of natural interest in selecting the material for our first lesson in Handwork, paper will be the material chosen, and folding and tearing the method employed in obtaining the different forms. The specimens illustrated under Paper Tearing are based on the Square, Rectangle, Equilateral

Triangle and Rhombus, and provide suitable exercises for children of all school ages.

Lessons in Clay as a free medium of expression should follow, or be taken alternately with the folding and tearing lessons, which necessarily demand fairly accurate manipulation.

This work may be followed by the free cutting of pictures from illustrated magazines or of outlines of animals or birds previously traced by the child from old picture-books.

Simple winding and weaving exercises in Raffia may now be engaged in. These should be executed on paper or cardboard foundations, or on simple cardboard looms made by the older children who are taking the cardboard course. This work may lead to similar work executed on cane foundations or spokes prepared by the children themselves.

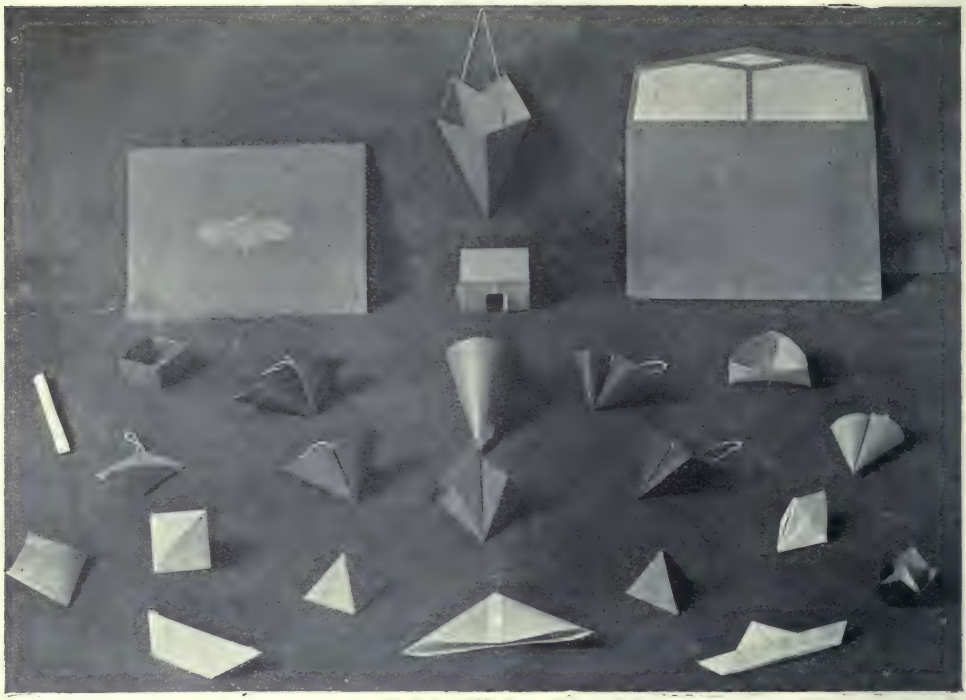
This provides a natural introduction to Cane Weaving and Basket-work, but the teacher should reintroduce from time to time a lesson in folding and tearing of a more advanced nature or a study in clay as a corrective to the tendency, common to all forms of weaving, to become mechanical.

The facility acquired at an earlier stage in free cutting with scissors (by the few lessons given in school and the many performed at home) will be evident now on the introduction of paper-cutting. This course should mark the beginning of, and be associated with, simple ruler drawing, and it should deal mainly with figures based on the square or oblong.

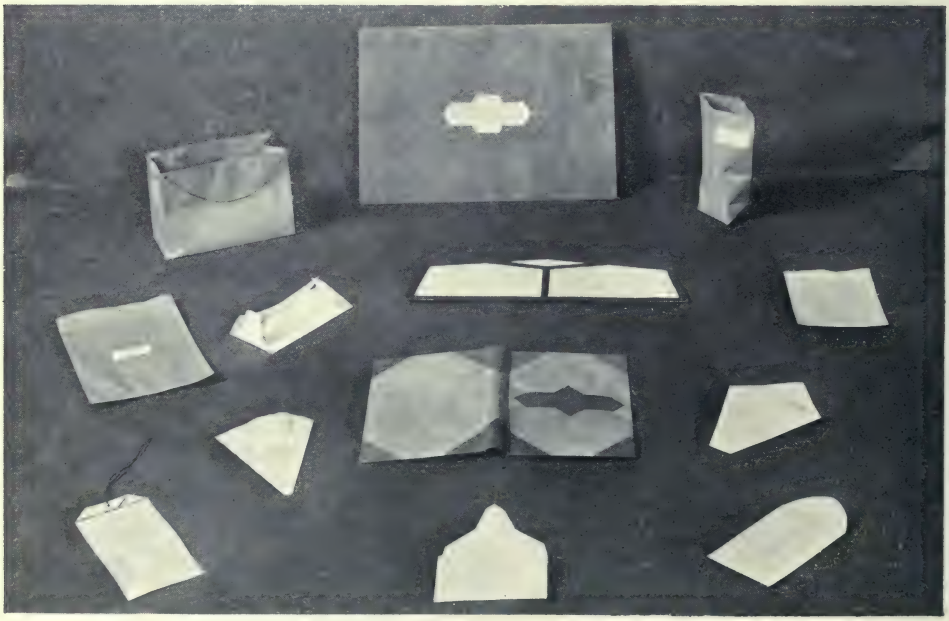
To the Paper Modelling which follows should be left the forms which demand more intricate drawing. At this stage that much-despised tool the "Sloyd knife" is capable of producing an interesting series of models, especially if preliminary preparation of the material required has been done for the children by the older pupils in the Woodwork course.

The Strip or Light Woodwork advocated by some might have a place here, followed by Cardboard Modelling, which is unequalled as a factor in acquiring a knowledge of geometrical construction, coupled with facility in drawing with instruments, and also as a preparation for the staple woodwork course to follow.

In a few schools only can metalwork in the accepted sense



PAPER TEARING



PAPER MODELLING

of the term be given, but little fastenings and furnishings, calling for exercises in filing, fitting and drilling can always be fitted to certain of the models of the woodwork course with a very few additions to the woodwork equipment.

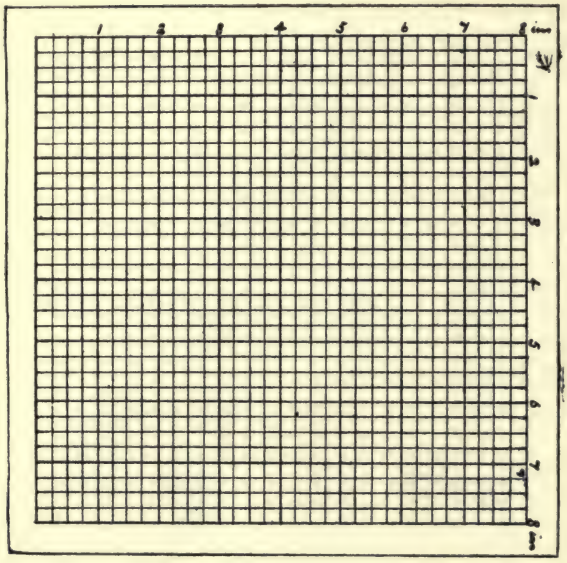
While these materials have been placed in what is considered their most natural order, paper-tearing is as applicable to the senior as to the infant division of the school, as also are clay and an occasional weaving exercise.

Limitation of Materials.—When circumstances demand limitation to two materials for school Handwork, Paper and Clay could be recommended without hesitation as being the two most adaptable to all stages. If a third be available, Cardboard should have the preference as being the material capable of the widest application for educational purposes. An ideal scheme of Handwork must include Woodwork, but to do so at the expense of work in materials which lend themselves to a more rapid solution and a more convincing proof of so many problems in education, is unjustifiable. It would be better for all schools to lay a good foundation and leave out the training which the advanced forms of Handwork so admirably provide, than to attempt the training at the expense of leaving out the essential fundamental work of a more elementary nature.

Methods Applicable to Work in Various Materials

It is quite impossible here to suggest in detail complete schemes of work in the different materials, or to deal with the methods applicable to the many applications of each. This treatment, while desirable, is not possible within the compass of the present article. The graduated scheme outlined in the last section is, however, treated with sufficient fullness to serve as a real help to those teachers who are in doubt with regard to a progressive course of Handwork along sound educational lines. It is proposed here to deal with general methods only, as they apply to some of the materials under consideration, describing an occasional typical exercise as an example.

Paper Tearing.—In dealing with the methods which apply to Paper Tearing it may be mentioned that one of the recommendations to this form of Handwork is the entire absence of



tools in the manipulation of the material. This is exceedingly desirable when dealing with young children, or with large classes of any age. The measurements for the various forms, *i.e.* Square, Oblong, etc., are obtained either from the square-inch markings generally found on the tops of infant-school desks, or, when these are not available, by means of a square of cardboard ruled and marked as in the accompanying diagram. For regular school work suitable paper for tearing should be obtained about two inches larger than the size required. It is well, however, for the teacher to demonstrate the method of obtaining the different forms from irregularly shaped pieces, to show that the paper with the machine-cut edge supplied to the children has no bearing on the finished form.

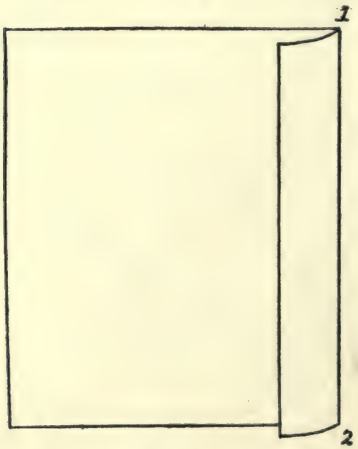


FIG. 1

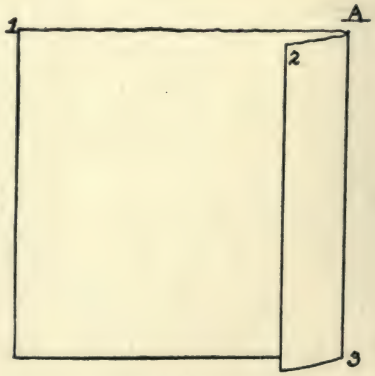


FIG. 2

To Tear a Square.—To obtain a square the paper is taken as in Fig. 1, folded along the line 1–2, then creased sharply with the thumb-nail of the right hand. It is then turned so that the surface showing the ridge of the crease will be uppermost. Resting the left hand on the paper, with the nail of the forefinger on the point marked 2, which is now at the top, the waste strip is torn off, being pulled, not towards the operator, but to the right in the process. This gives the torn edge 1–2 for the first side of the square. To get the second side at right angles to the first it is necessary to make that part of the edge 1–2 (Fig. 2) fold back and coincide with the larger part of itself lying on the desk, after which the process of creasing and tearing is repeated. The

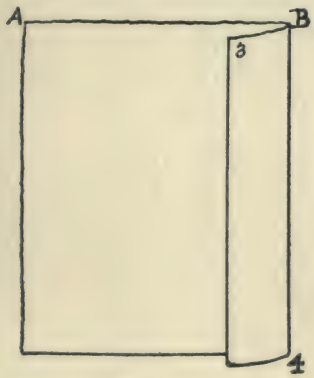


FIG. 3

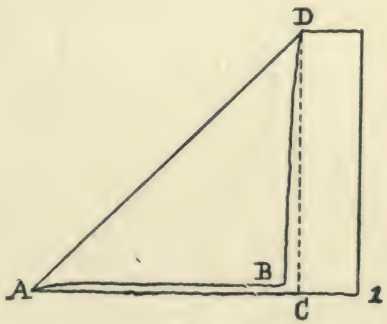


FIG. 4

corner *A* is then placed at the zero point of the cardboard measuring-square, and the size of the side of the square of paper required will determine the position of the point *B* (Fig. 3). Proceed then as with the former side. The position of the last side of the square is determined by folding over the sheet of paper with *A* as a pivot, so that *AB* is superimposed upon *A*1. From *A* mark off *AC* equal to *AB*, tearing off the waste along the line *CD*, as in Fig. 4. In models where the folded diagonal *AD* is objectionable, or in the case of a rectangle, the second dimension is obtained from the measuring-square.

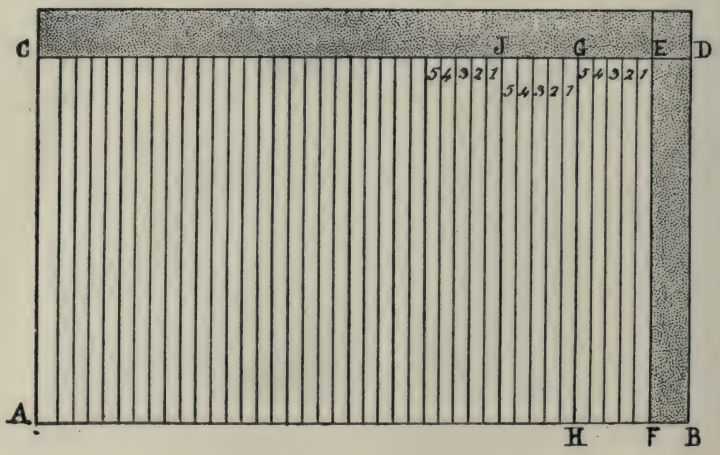
It may be asked: What gain is there in replacing what may have been neat and accurately machine-cut edges by edges the neatness and accuracy of which may be questioned?

1. A well-torn edge is always more artistic than a clean-cut edge, and it is well to begin early to train the artistic sense.

2. The ability to tear accurately is not acquired by children in a single lesson—its acquisition requires care and frequent repetition.

3. The processes involved are educational, presenting incidentally, in an attractive form, much information which will be required by the child in school and in after life.

Suitable Tearing Exercises for Young Children.—A suitable exercise for young children in this work is a bundle of spills, taken out of a sheet of foolscap that may have been previously



used for classwork. The diagram will illustrate the method employed.

AB represents a torn edge obtained by tearing the double sheet of foolscap down the fold; *CD* and *EF* indicate the top and side marginal spaces. Crease and tear along *CD* and *EF*, thus determining the length of the spills, and providing one vertically torn edge. From point *E* get the child to number or count the ruled spaces, putting a mark with the pencil on each line after the fifth space successively. Fold so that *E* coincides with *J*; crease and tear the edge obtained at *GH*; repeat the operation until say six pieces similar to *EFGH* are obtained. Then taking them individually, as in the rectangle *EFGH*, fold over *EF* to coincide with *GH*, and crease. Complete the spill

by sub-folding the edges *EF* and *GH* inwards to the crease as a centre. Two narrow bands of coloured gummed paper should

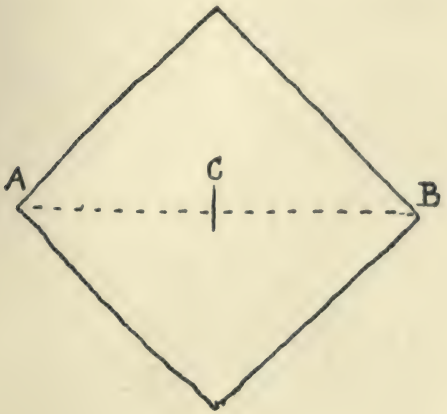


Fig. 1.

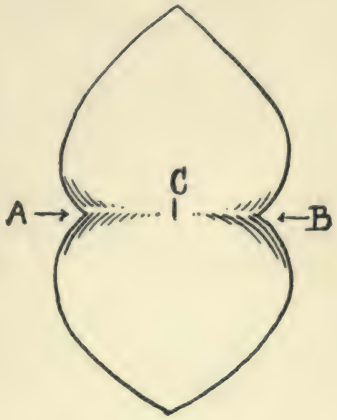


Fig. 2.

be fastened round the bundle about one inch from each end when made up.

The square with the diagonal fold constitutes the basis of many interesting forms of hanging pockets. Fig. 1 shows the square lying on the desk with the convex side of the crease *AB* uppermost. Make a transverse dent in the centre of the crease by approaching *A* towards *B*, and pressing with the finger at *C*. Pinch the folds at *A* and *B* with the forefinger and thumb of both hands, and pull towards one another as in Fig. 2, passing the angular point at *A* under the corresponding one at *B* (Fig. 3). Fold over

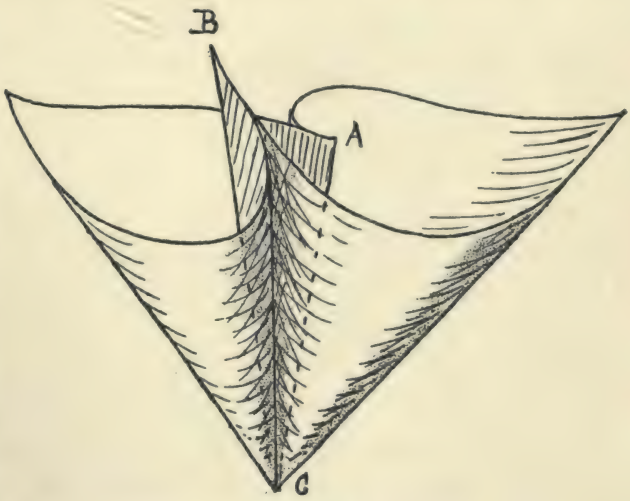


Fig. 3.

to alternate sides the upstanding points and fasten either with a pin or with small paper-fasteners. A cord may then be in-

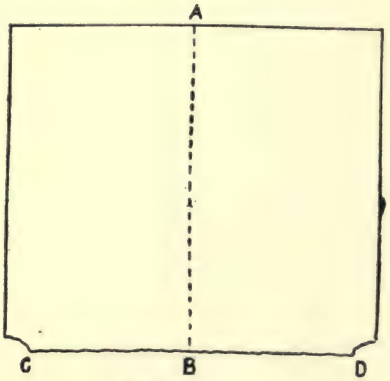


FIG. 1

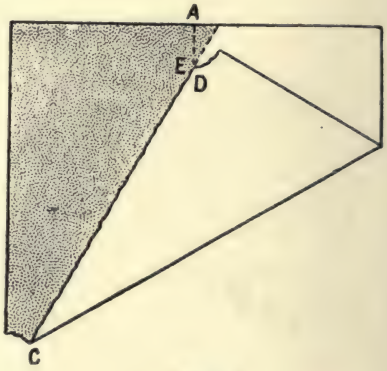


FIG. 2

serted under the fastenings and the model is complete. By varying the folding operations of this model the difficult forms illustrated under Paper Tearing may be obtained.

Paper Tearing for Seniors.—As an example of Paper Tearing applied to the work of the upper classes in schools, models based on the equilateral triangle and the rhombus offer a scope for much good work. Let us consider one example.

A sheet of foolscap or a page of a jotter will serve as material,

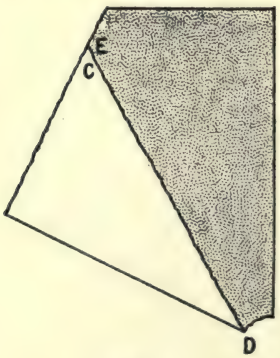


FIG. 3

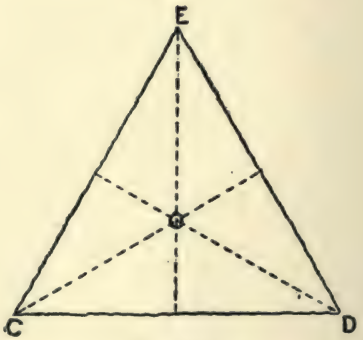


FIG. 4

the primary aim of the lesson being the visualising of a pyramid, a form often confused by children with a prism. Fold the sheet of paper along the centre line *AB*. From *B* measure

half the length of the base, and tear off the corners when folded to give *C* and *D*, thus determining the length of the base (Fig. 1). Fold over the paper with *C* as a pivot, and

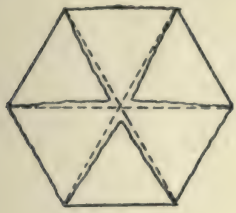


FIG. 5

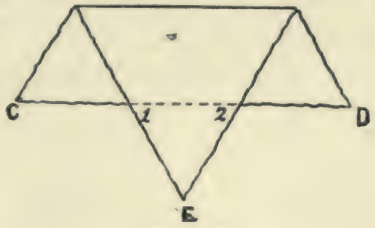


FIG. 6

make the point *D* fall on the line *AB*; then fold, crease, and tear off the shaded portion (Fig. 2). Mark point *E* on the line *AB*, and fold *C* to *E* (Fig. 3). Fold and crease the line *ED*, and remove the shaded portion, giving an equilateral triangle, with the three lines of altitude indicated by folds, as in Fig. 4. Fold the points *C*, *D*, *E* to centre *O*, thus obtaining a hexagon; crease these folds the reverse to those already made (Fig. 5). Fold as in Fig. 6, making 1–2 coincide with *CD*. Repeat from each of the three corners, folding in the same direction, as in Fig. 5. The development thus obtained will correspond with Fig. 7, the folds along the lines *EB*, *CF*, *DG* being convex, those along 1–2, 3–4, 5–6, and 1–4, 2–5, 3–6 being concave. Fold in *F* to superimpose in on *Z*, and turn in *E* 1–2 to keep it in position. Treat the other corners similarly and a triangular pyramid will be obtained. This may be converted into a square pyramid by unfolding one of the faces.

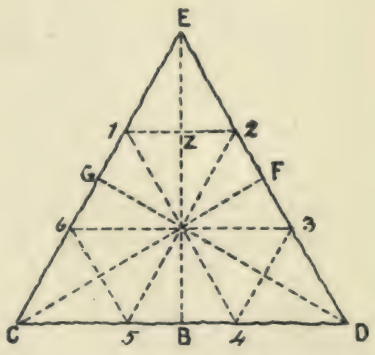


FIG. 7

In addition to affording training in Handwork, this model may be used incidentally to demonstrate the geometric forms, Triangle, Hexagon, Rhombus, to illustrate such terms as Base, Altitude, Diagonal, Right, Acute and Obtuse angles, and to provide data for various calculations of area and volume from actual measurement.

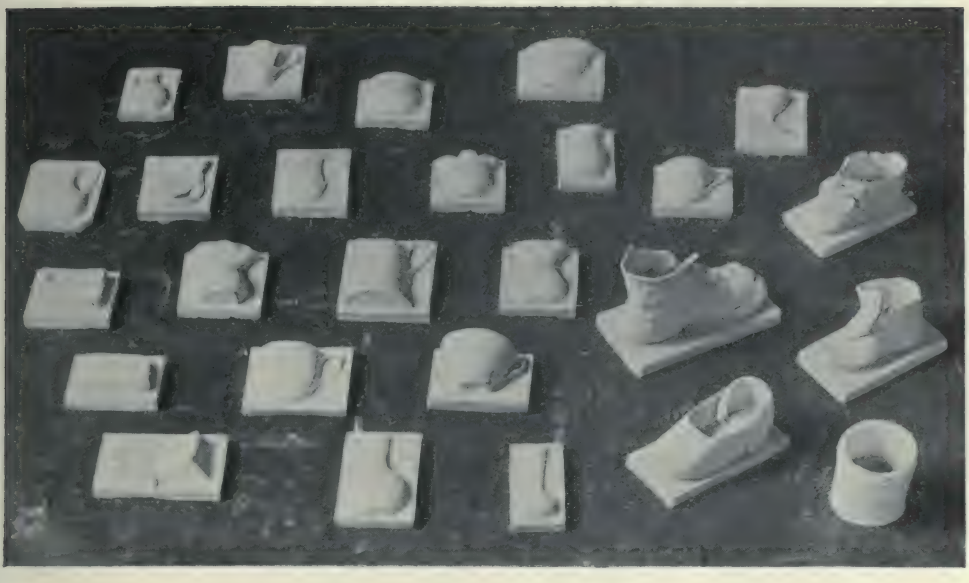
Clay Modelling

Clay can be obtained in two colours, grey and red. As the natural product is mixed with grit and sand and often contains iron, a purifying process is necessary; it is then milled and pressed to render it fit for modelling purposes. It costs from five to nine shillings a hundredweight, which quantity is sufficient to start a class of forty children.

Suitable Modelling Boards.—A school slate makes an excellent modelling board and does not absorb the moisture like one made of wood. For infant classes sheets of non-absorbent cardboard or squares of leather cloth are suitable and have the advantage of being light and easily stored. Most studies to be successfully treated must be modelled on a slab of clay previously prepared on the modelling-board, but many preliminary studies as well as fruit and vegetable forms can be modelled in the fingers without any such foundation.

Methods of Preparing a Slab.—The usual method of preparing this slab is to take, as a gauge for its thickness, two strips of wood seven or eight inches long, half an inch thick, and about one inch in breadth. They can be fastened to the board the width of the desired slab apart, by small nodules of clay. The space between the strips is then filled a little above the level of the gauge, after which the top of the slab is finished by drawing the edge of a flat ruler along the top of the gauge-pieces, thus removing the surplus clay, and leaving the slab smooth and equal in thickness. This operation is rather difficult for young children, and for them a wooden mould three-eighths of an inch thick, pierced with an aperture three inches square on the top side, sloping to three-and-a-quarter inches square on the under side, may be used with advantage. In a few minutes the clay can be packed into the central space, smoothed, and released from the mould. These methods of making a preliminary slab are admittedly mechanical, and as the pupils advance it will be desirable to prepare the slabs without such aid, gauging the size, thickness, and surface with the eye.

Principles to be Noted.—Methods of manipulation vary with



CLAY MODELLING: MEMORY STUDIES

CLAY MODELLING: NATURE STUDIES

the modelling of different objects, but certain broad principles might be noted in passing.

1. It should be remembered that modelling is a building-up process as distinguished from sculpture work or carving, in which form is obtained by a cutting-out of the solid slab. The carver starts with a larger block than is required, and reduces it, while the modeller builds up until the requisite size and proportions are obtained.

2. The chief features, such as the heights of the principal parts, should first be obtained in correct relation to each other before the rendering of detail has been begun. Attention to this point will correct a tendency to a common fault in modelling in relief—that of *flatness*.

3. Character rather than finish is important, and the leading characteristics of structure and texture should be sought after in preference to a laboured accuracy of detail.

With attention given to these principles a large amount of individual freedom in method of execution should be allowed.

Objects for Modelling.—Nature should be the chief source of supply of objects for modelling, and for beginners simple spherical or ovoid forms such as the cherry, apple, potato, onion, plum, lemon, etc., should be chosen; progressing to more elongated studies, *e.g.* radish, pea-pod, banana, division of orange, and thence, with gradual transition from shells, and simple forms of foliage and natural growth, to the simple animal forms such as star-fish, crustaceans, fish, and reptiles. As pupils can only express what they see and realise, and as such knowledge in this case comes from accurate observation, these studies, which should be taken only as types, are equally suitable for all ages. When possible, objects should be selected for study which can readily be represented in their natural size, and in the early stages preference should be given to those which can be modelled by the fingers alone.

Memory Studies.—Memory studies should occasionally be given of forms previously modelled from the object, as well as of common objects, familiarity with the form of which may be presumed. According as the pupil's stage of advancement admits, the principles of design as applied to ornament in low relief

may be gradually introduced. This would necessitate a more or less formal rendering of the subjects, and eventually lead to the modelling of designs for simple craft work to be executed in plaster, wood, and metal.

Tools.—Modelling-tools can be limited to a few wire and wooden forms, and should only be used when Nature's tools—the fingers—are unsuited for the work.

Raffia Winding, Weaving, and Plaiting

Raffia is the name given to a species of African palm which has exceedingly long narrow leaves. The thin outer skin of these

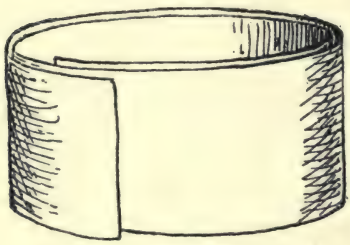


Fig. 1

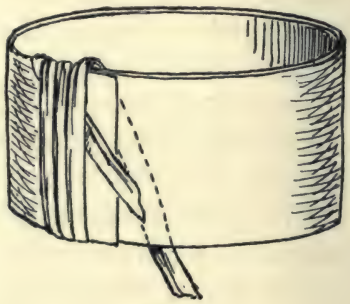


Fig. 2

leaves is peeled off, and after preparation is exported chiefly from the island of Madagascar. It is used largely by gardeners for tying up plants, but it also forms an excellent medium for Handwork occupations.

The simplest method of using this material is that of winding it round previously prepared paper or cardboard foundations, the end of each strand being held securely in position by the one which follows. Very effective work may be obtained in many exercises—for example, the napkin ring. If a band of thin cardboard twelve-and-a-half inches long by one-and-three-quarter inches wide be coiled within itself to make a ring of one-and-three-quarter inches diameter, a suitable foundation is prepared (Fig. 1). This is then wound vertically with a coloured strand of raffia, the edges slightly overlapping (Fig. 2). Next a second layer of raffia of natural colour is overlaid upon this. If now,

in the second step, several strands are consecutively drawn together at regular intervals and tied in the centre of the strip, a diamond pattern will result, the coloured raffia showing this form through the upper layer (Fig. 3). A few suggestions for Raffia Weaving are also shown in one of the illustrations, along with two very primitive cardboard looms which can be prepared by the children. The work is detached from the smaller loom by simply cutting the cardboard along the series of holes at each end, after which the woven material is folded, and sewn up the sides. Two small plaited handles are fastened to the upper edges and the little bag shown in the illustration is completed. The strands of raffia forming the warp which go round both sides of the larger loom are cut across the centre of the back, the loose ends are then threaded through a darning-needle and woven back into the material. By introducing coloured strands and varying the threading, different patterns can be obtained. In this way woven mats and materials for various forms of bags can be prepared. In the weaving a long Kindergarten needle is used as a shuttle to carry the woof athwart the warp.

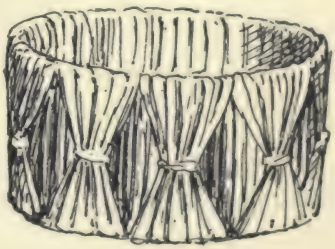


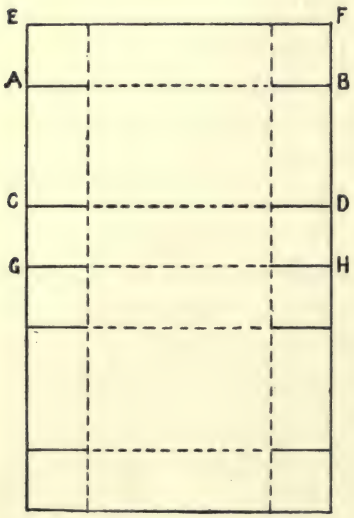
FIG. 3

The hats in the illustration are made from five-plait strands sewn together in the usual way. These plaits, as well as those composed of a larger number of strands, make very useful mats, or by lapping the edges slightly they may be fashioned into shallow trays of various design. For young children the plaiting of raffia is in itself a very useful exercise in manipulation, and can be made both interesting and artistic.

PAPER CUTTING

Paper-cutting introduces drawing with the ruler. One illustration will serve as an example. This diagram is based on the square inch, and if the whole figure is considered too large or too difficult, one half only need be treated, *EFGH*, showing the development for an oblong box. The end units of the lines *AB* and *CD* are cut, and the remainder, as well as all other dotted

lines in the diagram, are to be folded. The square-inch portions at the corners are then turned back against the sides of the box, and if the drawing and cutting have been accurate the edges *FB* and *EA* will coincide with *DH* and *CG*. These free edges are held together by strips of adhesive paper, the spare length of which is turned over to the inside of the box. If the whole development be treated, a box with a lid will be produced hinged along the line *GH*. By attaching an internal flange of paper seven inches long by one-and-a-quarter inches wide to the inner surface of the other three sides, the lid will be kept in position when closed. For these exercises stout tinted paper is generally used, but the cartridge-paper on which the development of the box has been drawn may also be used for the constructional part of this and other similar lessons. When it is desired to preserve the drawings and construct the models from a different paper this material should be slipped under the drawing, and the extreme points of the various lines pricked through, thus determining the position of the lines on the material from which the model is to be built.



Cane Weaving

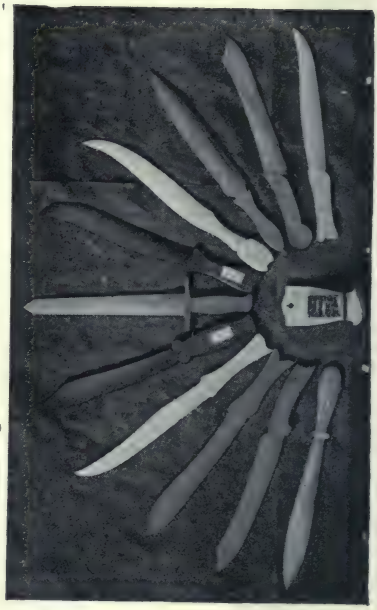
Space will not permit of the treatment of methods of Cane Weaving here. Several suitable examples are shown in the illustrations, and full directions for work in this material may be readily obtained from the various publications that have been issued.

Paper Modelling

The illustrations dealing with Paper Modelling show a few specimens of paper-bags and wallets, work-envelopes, book-cover, etc.

CANE AND RAFFIA WEAVING

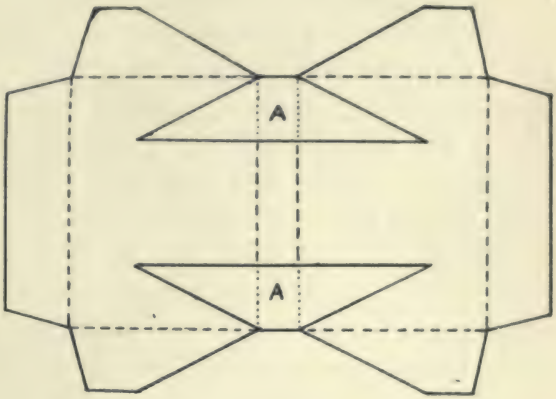
CANE WEAVING



CLAY MODELLING: SHELLS

SLOYD KNIFE WORK

The detachable book-cover may be taken as an example which will appeal to most teachers who find that the covering of school-books when done at home is not always satisfactory. Glazed brown-paper should be used. A sheet sixteen inches by thirteen is a fairly convenient size, as it is large enough for most school books. The accompanying diagram is set out on the paper. By inserting the end of a footrule into the crease where the back of the book joins the board, and moving it steadily round, the distance from the crease to the centre of the back is accurately determined. Twice this dimension gives the width required for the back of the cover. Measure the boards, allowing, say, one-sixteenth of an inch extra for thickness for each turn-in of the cover. The flaps to be turned in should measure two inches in breadth all round and should be securely glued to each other at the corners. The parts marked *AA* in the diagram should not be cut off, but turned in, as shown, and glued, thus adding to the durability of the cover. The strength of the cover may be further increased and its appearance enhanced by the addition of a back and corners of paper of a different colour.



Sloyd Knife Work

A few good exercises in edge-shaping with the knife are illustrated under this heading. They comprise photo-frames and racks for letters, keys, scissors, and pipes. The material used is three-ply alder. The design for the outline and the decorative treatment is prepared on paper and then transferred to the wood, and the outline is cut with the knife. The wood, after being sized, is treated with water or spirit stain in one or more tints,

to throw out the design. The model is then finished by rubbing it with beeswax dissolved in turpentine. This work affords good opportunity for the practical application of drawing. Designs for match-holders and napkin-rings are also shown. Those made from the natural limb of the tree form very attractive models for a Rural School Handwork course. The wood is first bored with a brace and bit (the ring right through, the match-holder only two-thirds through the wood); the knife is then inserted and the wood pared off to the contour of the section of the limb until only a thin lining of the wood remains inside the bark.

Amongst the models shown is a paper-knife which has been fashioned with the sloyd knife from a cylindrical model made in the woodwork course. Plant tallies and flower-pot sticks are among the many other objects which can be formed with the knife. For all such straight-edged models the wood should be split, not sawn.

Cardboard Modelling

Elementary Cardboard Modelling.—In the production of the models illustrated under Elementary Cardboard Modelling, two points have been kept in view:

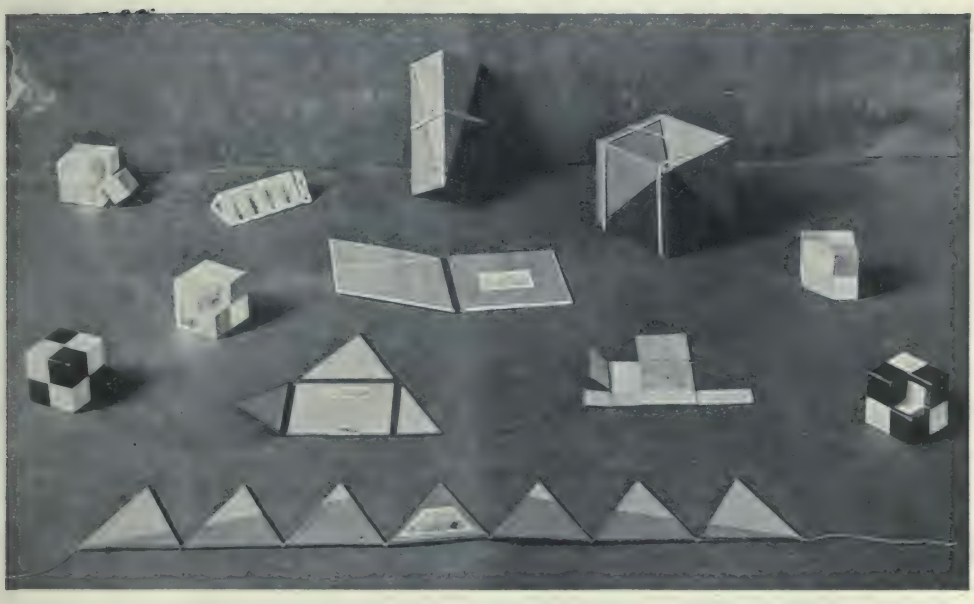
1. The dispensing as far as possible with glue, adhesive paper being used for mounting purposes, and tiny brass clips for fastening trays, boxes, etc.

2. The entire abolition of bound edges, and surfaces decorated with fancy covering-papers.

The first point brings the teaching of cardboard within the reach of the teacher of even a large class. The second avoids that excessive repetition which is so often justly alleged as an objection to work in this medium.

The educational value of cardboard lies mainly in the opportunity it affords for the production and practical application of a working drawing, and the training in accuracy and deftness which the execution of these operations implies. The simplest and speediest method of performing that part of the work which lays itself open to the charge of over-repetition is therefore best —viz. the fastening and finishing; hence the introduction of the brass clip. The drawing of the mats, and the development of

ELEMENTARY CARDBOARD MODELLING



CARDBOARD MODELLING APPLIED TO MATHEMATICS

WOODWORK

WOODWORK

most of the trays, boxes, etc., are evident from the photo reproductions, and require no description.

Cardboard Modelling Applied to Mathematics.—In the illustration of Cardboard Modelling applied to Mathematics, the cube and sections of the cube are shown, for the purpose of demonstrating volume.

Visual proofs are also given of the following mathematical theorems: (1) Parallelograms on the same base and between the same parallels are equal. (2) The interior angles of any triangle are together equal to two right angles. (3) $(a + b)^2 = a^2 + 2ab + b^2$. (4) The area of a regular polygon is equal to the area of a triangle whose base equals the perimeter of the polygon, and whose altitude is equal to the in-radius of the polygon. In these studies the binding of edges and covering of surfaces is introduced as being essential to the successful treatment of the figures.

Woodwork

The Function of a Handwork Text-book.—The most common fault in text-books on Educational Handwork is a lack of suggestiveness. "This is the way; walk ye in it," might appropriately be written on the title-page of many such books. The aim of a text-book on this work should be to stimulate, rather than to dispense with, the inventive powers of the reader, and if a course of models be wrought out to a conclusion it should be with a view mainly to show what can be done along certain lines. For example, in the simple model of the turn-button, certain definite operations with various tools must be executed in a proper manner, but the mere fashioning of this article after a fixed pattern is not the chief desideratum.

Freedom in Treatment of Details.—Ample scope is left to the pupil to carry out the details of treatment after his own bent. This may be seen in the central insets shown in the illustration. Similarly, the straight outline type of the hat-hook built with the dovetailed halving-joint lends itself to many varieties of treatment such as are shown below it. The same modification of treatment illustrating how freedom of individual expression may be combined with prescribed and directed operations is shown in the tooth-brush rack, match-holder, soap-box, and

ink-stands displayed. (See photos.) This freedom in the matter of detail has the additional advantage of enabling the pupil to utilise for further effort material which, under the usual methods, would be discarded. The four illustrations given of the soap-box will exemplify the foregoing statement. The bowl and back are dovetailed together, but if the first attempt is unsatisfactory, a second, or even third, fitting can be attempted on the shortened length of the back, the final result determining the form of outline.

Metalwork

These methods apply similarly to Handwork in the different metals. Objects made from wire and strip metal lend themselves to varied treatment of outline, a few simple examples being shown in the pen-rests fitted to the inkstands—see illustration, "Metal applied to Woodwork." The ink-well covers fitted to the same models show how exercises in filing and fitting sheet-metal may be adapted to a woodwork model. The copper bands in the larger inkstands were utilised primarily as an exercise in wiring the edges, the method of decoration being left to the individual.[1]

Repoussé work in brass and copper affords a field of exceptionally interesting craft-work, capable of being allied to the drawing and clay-modelling courses, and applied to the construction and decoration of the woodwork models. The square trays illustrated —see illustration, Repoussé Work—afford elementary tool-practice in this work, the sides being either soldered at the corners or drawn out of the solid. The round tray gives an example of work beaten from the flat sheet and afterwards embossed. The copper bowl shows a piece of work drawn out of the flat sheet and finished off with the hammer.

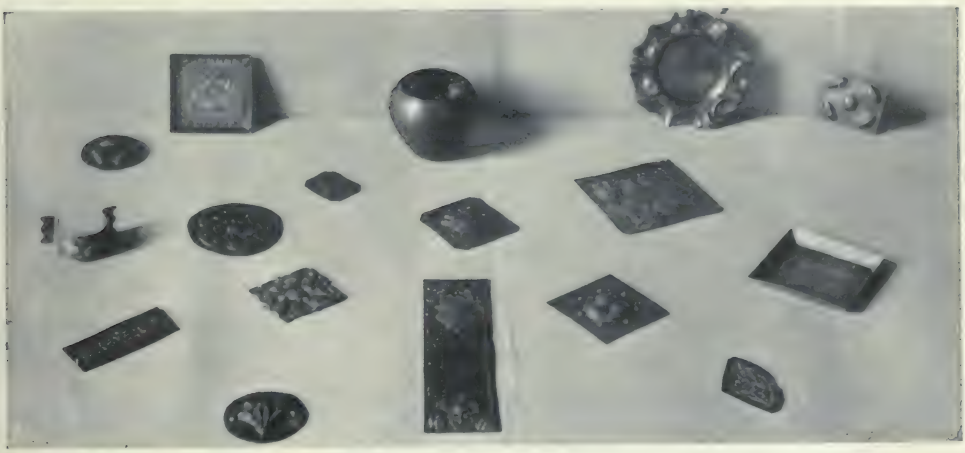
The laying off, and development in zinc and tin-plate work, of the constituent parts of models should be executed by each pupil, who will recognise in this a practical outlet for his previous training in mathematics and cardboard.

A few elementary exercises in forge-work and turning are included in the illustrations, but for the execution of this type of work a specially equipped room is necessary.

[1] The inkstand has been advisedly chosen to illustrate new forms of treatment that may be applied in the case of a model generally considered hackneyed.

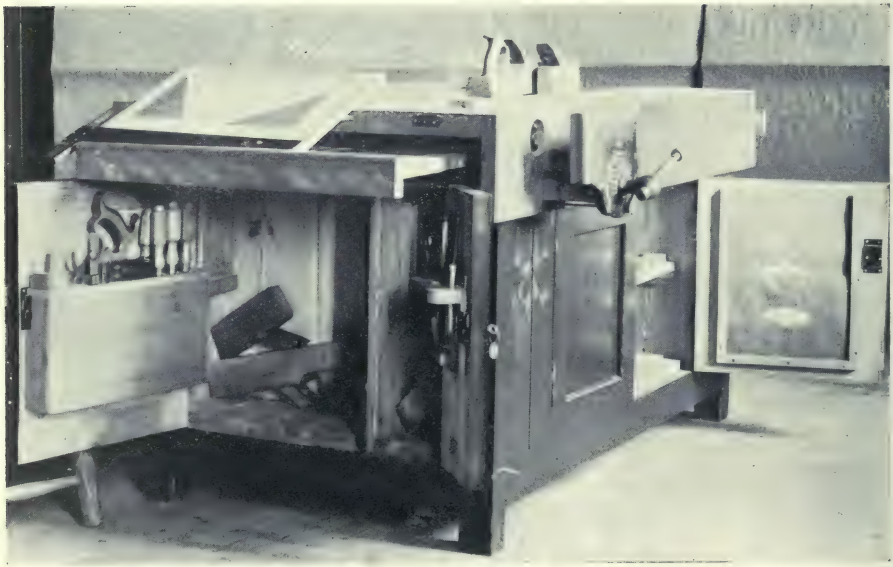
METAL APPLIED TO WOODWORK

METAL WORK



REPOUSSÉ WORK

TOOL CUPBOARD



COMBINED BENCH FOR MANUAL WORK

The Class-room as Equipped for Handwork

There are three different arrangements prevailing for the teaching of the advanced forms of Handwork:

1. The Manual Training School—a building set apart for the teaching of Handwork in its different forms.

2. The Handwork Centre—generally a large well-equipped room or suite of rooms situated in convenient central schools in a city and drawing its pupils from the schools in the neighbourhood.

3. A Handwork room of a less pretentious nature attached to each school.

In special circumstances each arrangement has its own advantages, but the ideal arrangement is undoubtedly that of having a room attached to each school if this room is reserved for Handwork only and not also used for domestic subjects.

The class-room equipped with the modern single or dual desk is quite suitable for all forms of Elementary Handwork. Clay-modelling is better conducted in a room reserved for that purpose, and such provision will be found in all well-appointed city schools at no distant date. The messiness generally associated with the teaching of this subject, however, disappears where the teacher's methods and discipline are good. There is no reason, therefore, for the exclusion of this most interesting form of Handwork from the regular class-room. Woodwork calls for a specially equipped room, and a bench is illustrated in this article at which the writer has taught not only woodwork but all the forms of Handwork treated in this article.

One room so equipped in a school practically solves the question of junior and senior Handwork.

The bench is provided with sliding tables at each end, which are intended primarily for drawing, but which can also be used for all the lighter forms of practical work, one pupil sitting at either side of each extended table, while two stand, one at either side of the bench. This makes provision for six at a bench, or accommodation for sixty for junior Handwork in a room which is equipped for twenty pupils for woodwork. The bench is fitted with two tool-cupboards at each end, racks for small tools

being fixed on the back of the cupboard doors. The larger of the two cupboards contains the woodworking tools, situated at the right rear of the operator, and the smaller the equipment for junior work. The doors on the *sides* of the bench give access to twelve compartments (six on each side of the bench) for the storage of work, while the backs of these doors are fitted with racks for envelopes containing the working drawings. These latter arrangements avoid the necessity for giving out and collecting material at the beginning and close of a lesson. The initial cost of this bench is high (about £6), but against this must be reckoned the variety of work which may be performed at it, and the fact that it dispenses with the necessity for storage cupboards, there being twelve individual compartments in every bench, each of which may be shared by three or four pupils in the same class. The size of this bench is five feet long by two feet nine inches wide. A tool-cupboard is also illustrated which provides storage for those tools which are common to all pupils and not included in the bench equipment. In addition the room should contain at least one metalwork table fitted with vice, and there should also be sawing-trestles and ample blackboard surface. Typical specimens of wood should be displayed, while specimen cupboards well stocked with work of different varieties executed during the current session afford interest to pupils and visitors alike.

Where a special room can be set aside for Metalwork it should be equipped with a small forge and anvil. One or two leg vices should be provided to hold work, the formation of which in the vice necessitates the use of the hammer. The others should be parallel vices, fixed to individual metal tables, which can be procured fitted with tool racks and drawer for storage of work. These tables are quite rigid without fixing to the floor, and can be readily moved to any part of the room or turned to suit the light when in use. A long wooden table or bench, fitted with drawers and cupboards underneath, is necessary for work other than filing and fitting. The addition of a lathe and vertical drill, together with a small complement of hand tools for fitting, forging, turning and sheet-metal work, would provide a good and economical equipment.

Tools and Materials

It has been truly said that the great gulf between the savage and the civilised man is spanned by the seven hand-tools—the axe, the saw, the plane, the hammer, the square, the chisel, and the file. Had the commentator gone through a whittling course in his boyhood, he might have prefaced the list with the knife. These, however, are the universal tools of the arts, and with a few modifications and variations they stand as the ideal workshop equipment of to-day.

Woodwork Equipment.—The woodwork equipment shown in the bench illustrated comprises one each of the following: jack and hand plane, ten-inch tenon-saw, six-inch try-square, marking gauge and knife, footrule, wing-compasses, three-sixteenth, quarter, three-eighths, half, and one-inch chisels, three-quarter and one-inch gouges, and mallet The three first-mentioned chisels are of the " firmer " variety, while the last two have bevelled edges. The two smallest chisels are of specially thick section for mortising. The special cupboard with tools common to all pupils in the woodwork course contains two each of the following: rip, panel, and dovetail saws, stanley and trying planes, braces, mortise, and cutting gauges, and a supply of sloyd knives, cabinet files, spokeshaves, incannel and small gouges, various boring-bits, bradawls, screwdrivers, pliers, nail-punches, large try-square, axe, etc. The drawers are used for glass paper, nails and screws, drawing-paper, teachers' stationery, class-registers, etc.

A similar cupboard should provide accommodation in a metal-work room for such extra tools as stocks and dies, hack saws, turning tools, drilling bits, shears, soldering bolts and repoussé tools. The latter should consist of about three dozen tracing and matting tools and punches. The best receptacle for the pitch upon which the metal is fixed for embossing is a cast iron bowl half-an-inch thick, seven inches in diameter, and semi-spherical in section. While in use this bowl should rest in an iron ring about a quarter-inch in thickness, and one-and-a-quarter inches in depth. This ring should be coiled with rope to deaden the sound of hammering, and should be large enough just to keep

the base of the bowl off the table. The pitch should be mixed in equal proportions with stucco and a small piece of tallow should be added. When melted, it is poured into the bowl and allowed to set. Only a slight heating of the upper surface of the pitch is necessary when the metal is being attached.

Equipment for Junior Work.—The small bench-cupboards previously referred to contain steel straight-edge and bone folder for cardboard folding, scissors used for all cutting work in paper and elementary cardboard courses, cardboard knife for thick cardboard in advanced course, pencil compasses, pricking needle, glue-brush, and ruler.

Materials.—The tools and materials used for other forms of Handwork have been referred to in dealing with the work in these materials.

The cardboard recommended for use is the kind which can be obtained in three thicknesses, either tinted or white. Leather boards and pulp boards may be used for covered work.

Wherever possible, wood for elementary work should be obtained cut to size and ready for distribution to the class. This arrangement need not interfere with ample sawing practice being given to the pupils.

Among the varieties of wood most suitable for school work are Yellow pine (*Pinus strobus*), Northern pine (*Pinus sylvestris*), Kauri pine (*Dammara australis*), Basswood (*Tilia americana*), American whitewood (*Liriodendron tulipifera*), Plane tree (*Acer pseudo-plantanus*), Birch (*Betula lenta*), Oak (*Quercus robur*), Chestnut (*Castanea vesca*), Mahogany (*Swietenia mahogani*), Walnut (*Juglans nigra*), and Teak (*Tectona grandis*).

The coniferous varieties are best suited for the early stages of a course of work, as, being softer in texture, they render the various operations more easily performed. Hard woods should be used for models in which keen sharp edges are essential, *i.e.* paper-knife, straight-edge, etc. Expensive woods should be reserved for inlaying. The glueing of models is not generally desirable in school woodwork, and where a special finish is desired fuming and waxing are to be preferred to french-polishing.

The varieties and thicknesses of the metal to be chosen for

work are best determined by the individual teacher after consideration of such circumstances as, age of pupils, their previous experience of Handwork, nature of equipment, etc. As a general rule, however, a variety of wire, brass, and iron, both round and square in section, and varying from 15 to 23 B.W.G. will be found suitable for class-work. Material for strip metalwork should rarely exceed 23 gauge, and that weight will also be found suitable for Repoussé, Zinc and Tin-plate work. Heavier sheet-metals should be used for filing and fitting exercises, while materials for forge-work and turning can be readily procured in all sizes to suit the work in hand.

VII

MUSIC IN SCHOOLS

By Dr. Arthur Somervell, B.A., Mus.Doc.

In considering the subject of Music in schools, it is necessary first to arrive at a clear idea of the purpose and use of the subject in the general scheme of education; more particularly because, in modern times, certainly throughout the short period during which a public education has been given in this country, there has been, generally speaking, a complete misunderstanding on this point.

It is evident that, during the brief period of a child's school-life, we have no right to teach any subject which has not some definite purpose to fulfil in the general scheme. If it be assumed that the wider aim of education is to develop all the powers of body and mind, to the point at which a child will find himself best able further to develop them, and to use them, with a due sense of the adjustment of his self-culture as an individual with the claims on him as the member of a community, what share is Music intended to take in this development?

Music an Appeal to the Senses

It is obvious that the first and great appeal of Music, unlike that of nearly every other subject in the curriculum, is not to the intellect at all—a fact which is, perhaps, the cause of the unintelligent treatment accorded to it by educationists; most of these being highly intellectual persons, who, from child-hood, have been encouraged to develop themselves, and to find satisfaction almost exclusively on the intellectual side of their nature: they are, therefore, naturally apt to overlook the importance of subjects which make an early appeal through the

senses and have no obvious intellectual results. The tendency is to regard the teaching of such subjects as concessions to youth and human nature, and as having only a very indirect bearing on mental development.

Musicians and other teachers of artistic subjects have not counteracted this tendency, because it is of the essence of the artistic nature to follow an instinct without reason; and though this leads perfectly normally to artistic development, it has hindered the right use of Art in educational work, by causing the purpose and process of such work to be stated and directed by those who have no conception, reasoned or instinctive, of what that work really is.

The result has been the wholly wrong treatment of all the rhythmic arts, which some of the greatest men who have ever lived have believed to be the right foundation of all education, physical, intellectual, and moral, for both boys and girls. They have, until lately, been treated as innocent and suitable recreations only, and have been generally the first subjects to be dropped out of the curriculum in favour of "really important" or "practically valuable" subjects.

Importance of Rhythm in Education

The claim here put forward as to the value of the rhythmic arts is no new one, and has been made by thinkers as far removed from one another by time, nationality, and circumstances as (to mention only two) Confucius and Plato, while Shakespeare, more than once makes a man's response to "music in himself" the test of character and ethics. This claim is, that to awaken responsiveness to the appeal of the rhythmic arts in early childhood is the way in which to develop and train the imagination, and to widen the capacity for the feeling and expression of emotion in an orderly manner.

Responsiveness to Music (in Plato's sense) is the outward and visible sign of an inward sensitiveness to the rhythm in all things, and is therefore the greatest of harmonising and humanising influences. The Greek, of course, included in his conception of music all the rhythmic arts, poetry, or rhythmic speech, dancing, and other rhythmic motion, plastic and other rhythmic design,

as well as song and instrumental music. There is little doubt that this conception was shared by the Chinese of old and by the Japanese of yesterday.

Those who have ever watched the beautiful experiments connecting sound and form, or have worked with a twin-elliptic pendulum, know that the laws which musicians and artists have worked out instinctively are no arbitrary dogmas, but are an attempt, however incomplete, to express the immutable laws of rhythm, harmonic relation, and number, by which everything that is, exists. Pythagoras seems to have forestalled the hints given by common experiments in the physical laboratory, when he would have it that "the universe is made and kept together by Music."

Everything that we know anything about both exists as, and acts in and through, rhythm, and the claim emphasised here is that Music is the earliest and easiest means at our disposal for cultivating in the human consciousness sensitiveness to the higher rhythms; producing that imaginative power which, in matter of mind, has the effect of harmonising facts, relations, and processes, and, in human relations, harmonises men with men and communities with communities. These two effects touch directly the results above defined as the aim of education—to adjust the claims of self-culture and those of the community.

The importance of the nature of the rhythmic experiences of a child, and the indelible mark left on the subconscious mind of early sense-impressions, is the subject of one of the most famous passages in the *Republic* of Plato. It is familiar in the experience of every one, and has been used by all the great religious organisations in their development of ritual. Impressions of this kind are held with involuntary tenacity, against reason and formed judgment, as any one will find to his cost if he attempt to criticise certain bad poems or tunes, familiar from childhood and endeared by association.

Value of Orderly Sense Expression

The child's subconscious race-inheritance—that which differentiates him from every other child—makes it fortunately im-

possible for educational systems to turn out results by the score after a pattern. In this race-inheritance must lie dormant, in varying proportions, the capacity for every conceivable experience passed through in the long history of the race. Now let us for a moment imagine this subconscious material as resembling a great stringed instrument, every string representing some feeling or experience which the child has the latent capacity to feel if it is set vibrating. The aim of art teaching, through Music in its widest sense, is to bring about in this region response to the forces which were the real cause of the music, and so to begin to train the senses and emotions to rhythmic and orderly, instead of non-rhythmic and disorderly response. It must be remembered that in early childhood the reasoning powers are, in the vast majority of cases, almost entirely dormant, while the senses are keenly alive—very often far more so than in later life. While many a truth or theory expressed in words will pass over a child's head, the same truth presented to him in the concrete, through the senses, is immediately apprehended, and becomes part of a large body of experience which, at a later stage, forms the material used in his reasoning processes, and is then synthesised, and related to the rest of his knowledge. If there is any real ground for the importance attached to the formation and fixing of habit, how great must be the value of spontaneous association of natural emotions, and especially of those directly connected with the senses with a noble, beautiful, and innocent expression of those emotions! It is a matter of common knowledge that the expression of an emotion reacts on the character and intensity of that emotion. It is not good to whine in self-pity, however maudlin the sufferer may feel about his woes. It helps him to be brave, to assume the virtue of bravery, even if he have it not.

Music Satisfies the Creative Instinct

Music touches also another and most important side of development; song is, perhaps, the only way by which a very young child can satisfy the creative instinct, by the creation and reproduction of a perfect thing, because not only is no apparatus required, but, to all intents and purposes, no skill is

needed. Most children can reproduce the perfect art-form of song almost before they can speak, and this, not only at stated times and of set purpose, but at any moment.

If this view of the office of music be accepted, it is impossible not to feel the futility of the way the subject is handled in most schools in the country. To " teach music " is usually thought of as training a child to perform on a solo instrument or to sing solos—just that part of music which ought, in the teacher's mind, to come last, and to be contingent on the completeness of that earlier training which every child has a right to receive. Only about 1 per cent of the population is tone-deaf, and even these could probably receive rhythmic training in another way than through the ear.

The Value of Traditional Song

The normal child ought to begin to sing as soon as he can speak, and from the infant school upwards, to become familiar with the largest possible number of good songs—those songs upon which all musical education ought to be built up, the great literature of traditional song, which is the natural inheritance of the children of every nation.

Musicians are often considered fanatical on this subject; but this is because it is almost impossible to overrate the importance of it from the artistic or from the educational aspect of the question. Thousands of books have been, and will be written by historians, by theologians, by philosophers, about the faiths, the thoughts, the actions, of our forefathers; endless is the controversy, inconclusive the result. But these songs, our national songs, are the direct outcome, unreasoning, instinctive, of the actions, the faiths, the feelings of the past, because their very intensity necessitated expression in song and verse. These songs set in vibration again, strong, insistent, irresistible, the very same emotions which produced the actions and convictions of the past, and which will reproduce them, in right and beautiful continuity. Moreover, this will not take place in the region of controversy, where men's understanding of one another is clouded by the use of words. It will be obedient to the true law of faith and of action which, in reverent sympathy with its own

part, interprets by the light of experience the problems of the immediate future. This may seem to some an exaggerated estimate of the power of song ; but those who think so are urged to consider why Edward III. killed the Welsh bards, or why the Russian Government endeavours to stamp out the folk-song and dancing in Poland, Ruthenia, and other provinces. Rulers do not do these things, which arouse great feeling, without some good reason. They know that continuity of national art-expression means the continuity of national life and ideals ; and in these cases the aim is to break this continuity and to extinguish the national life of the subject race. It is doubtful whether any adequate estimate has yet been generally formed as to the power of national song in the moulding of national character. "Let me make the songs of a country, and I care not who may make its laws."

These songs express on the whole the common emotions and aspirations of all men. If they did not, they would not survive as *national* songs. The Irishman and the Englishman will express their joy in the spring, their love, their patriotism, their humour, in different ways ; but, broadly speaking, they are the same emotions, produced by the same causes, and reproducing, broadly, the same effects.

These songs, have, in the majority of cases, survived by oral tradition alone ; and whereas most of the popular contemporary musical expression of the day, however great its vogue for the moment, dies out, and is forgotten, these songs last on generation after generation, showing that the appeal which they make is fundamental and unaffected by time.

Although no one ever dreams of suggesting that a love of literature should be taught by means of ephemeral verses in contemporary newspapers, it is frequently urged that contemporary music of corresponding value should be used in schools, and, until recent times, this class of music was very largely in vogue. A change has, however, come over the country, partly owing to the growth of the competition movement in England, and partly owing to the encouragement given by education authorities to the use of national songs, and there are signs on every hand of improvement.

The Necessity for Unison Singing

The practical application of the principles here laid down make it necessary to give children a wide knowledge of good song. This points at once to the necessity of singing in unison, by ear, in the early stages; and, if a really large number of songs is to be learned during the school period, the practice of teaching by ear should never be wholly abandoned. Teaching songs by ear, except to very small children, is looked upon with disfavour by many teachers; but it must not be forgotten that the power of a child to sing is always far ahead of his power to read, that a tune may be taught by ear in five minutes, and that every good tune learned is a possession for life.[1]

Objections to Part-Singing

Many teachers deprecate the practice of singing in unison as retrogressive, and aim more at the complicated art of the part-song. There are, however, several reasons against the use of part-singing to any considerable extent among children.

(1) There exists practically no really good music written by the great masters which is within the limited compass of the true child-voice.

(2) It takes a considerable time to teach children to hold true parts, and if the lower part is not dull and uninteresting it is generally because it has been made interesting by the employment of low notes, which no child ought to be singing, and which no child can really sing if he is producing his voice properly.

(3) The time spent on one part-song would suffice for the learning of half a dozen first-rate songs in unison—songs which would remain a permanent possession of every child in the class.

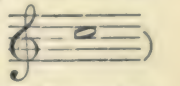
(4) Part-singing can be taught to children more easily and rapidly by means of well-written exercises for equal voices, or by means of Rounds, in which every child sings both the high and low notes.

(5) There is nothing so permanently injurious to the voice,

[1] National songs should always be learned as unison songs. They were not intended to be sung as duets, and the addition of an arbitrary alto part (generally quite uninteresting in character) often completely mars the pure curve of the melody.

especially at the age of from twelve to fifteen, as frequent and exclusive use of the lower notes. Where it is desired to teach a part-song, it is well to teach both parts to the whole class, and to vary the singing constantly by interchanging the trebles and altos. It is a common experience to find a few altos trying to hold their part against a large body of trebles, and this is one of the reasons why part-singing is often so unsatisfactory from the listener's point of view. The altos, handicapped in every way, are practically obliged to force their voices, in order to preserve some semblance of their part. But when a class knows both parts it is always possible so to arrange the balance that forcing by the altos is unnecessary.

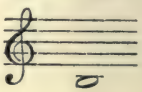
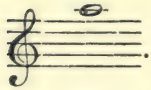
Voice Production

The whole question of voice-production is one of great importance, and some attention should be given to it every day, if only for three or four minutes. There are, roughly speaking, two qualities in the voice of a child: the lower, which is sometimes called the "chest" or "forced" register, and the higher or "head" register. If left to himself, the child will almost invariably imitate the adult voice and use the lower register, forcing this up as high as possible, invariably flattening in pitch as he rises up the scale. Beyond a certain point (about ) the use of this lower register becomes impossible, and his voice breaks into a perfectly clear quality of sound. This is the "head" voice, and is the one which should be cultivated by the singing of scales *downward* from a ***high*** note, not upward from a low one. In the early stages of downward scale-practice, the high notes should be sung fairly loud, the voices making a slight decrescendo as the lower notes are reached. In this way the pure quality of the head voice may gradually be drawn downwards, softening and sweetening the rough, low notes, until the child uses one quality of voice throughout his whole compass. It will, of course, be found that the lower notes in this trained voice will be weaker than the high notes; and this is the reason why the altos in a part-song are at such a disadvantage as compared with the trebles.

Vowel and Consonant Sounds

Teachers should vary the vowel-sounds as much as possible. One of the best ones to use at first is the sound "oo," and many find it so efficacious that they rarely use any other. But to do this is to risk stereotyping the vowel-sound, and losing flexibility of the lips, the result being lack of clearness in enunciation, besides the perpetration of some very ridiculous sounds.[1] All the vowel-sounds should be used, as well as combinations of two or more vowel-sounds: *e.g.* oo-ah, ah-ee, oo-oh-ah, oo-ah-ee, etc., while the enunciation will gain in clearness if certain resonant consonants, such as m, n, ng, l, th (as in thee), v (as in very) are practised in the same way as the vowel sounds.

Breaking and Changing Voices

The right use of the child-voice is very important, because, as with all other immature organs, permanent injury to the adult voice results easily from careless usage. There is practical unanimity among great choir-masters that the normal child-voice in boy and girl is treble, and that if it ever exists at all, the child alto is the rare exception that proves the rule. The treble, or child-voice, varies to a certain extent in quality, but not very much in compass, which ranges from  to  .

With both boys and girls a change comes at about the time of puberty, and at this time it is of the first importance that the voice should be treated with great care, never strained, and used little on the higher and lower notes of the compass. The sign with boys is the well-known "crack," and with girls the less familiar symptom of a loss of the high notes, accompanied by a husky weakness throughout the voice. The common practice, of setting cracking boys' voices to sing alto, is the most

[1] An English church choir is often heard to sing "Woo boosooch Thoo to hoor oos, good Lood."

injurious thing which can possibly be done to the voice, and accounts for thousands of spoiled voices in men who, as children, rejoiced in the exquisite treble of the well-trained choir-boy. This practice is still very common in English public schools, though, among the more enlightened teachers, this reprehensible sacrifice of future powers to immediate convenience is slowly falling into disrepute. Hardly less injurious often is the singing-class in girls' secondary schools. Among the girls from thirteen to seventeen—at the very time when the child-voice is going and the adult voice is forming—the best and strongest voices are selected for the highest and lowest parts in three- and four-part music. Many solo-singing teachers rightly refuse to teach any girl under eighteen or twenty who is singing in a singing-class or choir. One of the singing Professors at the Royal College of Music says: "It is the universal complaint in my profession that we get no fresh, undamaged voices to train. Instead of voices to train we are given voices to mend." Teachers have no more right to damage the voice of a child than to injure his spine or his eyesight by wrong or excessive use; and it is no excuse for taking so grave a risk of permanent injury to the adult voice to urge that so much more interesting music can be studied, written in three or four parts, than in unison, or for two equal voices. Most of these difficult and elaborate part-songs were written by composers for adult voices, and are entirely unsuitable for school-girls.

General Uses for Song

In schools where experience shows that the best results are obtained, the practice from the first is to teach music from two aspects, the first and most important being to store the memory and form the taste, with large quantities of the very best melody, while preserving and producing the child-voice as well as possible; the second aim is to train the ear, and to teach sight-reading in both time and tune, developing the power to hold a part, and, in the most advanced classes, giving further knowledge of the theory of music and a wider knowledge of musical literature.

The first of these objects is of great value to every child. From the infant school onwards, children should be soaked in

good melody—first, the old singing games and "jingles" with appropriate gesture and action, then scores of traditional songs. The words are a matter of minor importance, so long as the general spirit of them is caught; they should be sung in unison, with or without accompaniment, and, as much as possible, sung by heart. Comment on the meaning or the beauty of either words or music should be most sparing. All art training should, in early years, consist in letting the art make its own impression, and, of course, nothing but the best should be given. It is not the critical faculty that is being trained, and the teacher's concern should be to stand aside, and let the spirit of the song act on the spirit of the children and evoke spontaneous response.

In many schools song is effectively used between lessons, as a break in the middle of a lesson when the weather is especially trying, or as a safety-valve if there is undue excitement, when a *quiet* song will have the effect of restoring order immediately.

Song may also be very effectively used in girls' sewing-classes, and is useful in relieving the tedium and tension in this lesson, where the mind is often not adequately occupied by the work in hand, and yet where conversation would produce disorder.

There are schools where the material is very rough, in which singing and dancing have proved to be the only means of evoking any response at all, or of establishing any discipline, save of a penal order.

When children have learned a hundred or two hundred traditional songs and rounds, and the lower school has a large repertory of these, which can be called upon, without extra preparation, at any time, the older classes may, with advantage, study some of the great classical song literature of the great Masters—the songs of the old Italian composers, of Beethoven, Handel, Schubert, Schumann, and Mendelssohn, singing them in unison with English words. This is one of the readiest ways of becoming familiar with the work of the great Masters, and of training the taste to discriminate between good and bad songs.

Methods of Teaching Reading

Having thus provided throughout the school years that children shall hear and learn a large quantity of the best quality

of music, it remains to give them some training in the theory of the art in order to facilitate further progress after school life is over. Reading music at sight is really no more difficult than reading print at sight, provided it be taught in as intelligent a way as reading and writing are taught.[1]

One of the chief difficulties in teaching children to read is that of giving them enough practice. Most charts are of little value, as the tests are very short, and the number contained in a whole chart is often very small. It is not easy to find time to write enough upon the blackboard. The best solution, therefore, is found in giving a reading-book to each child. The price of these is very small, and they are now found in a large number of schools.

The teacher will do well to give each sight test only once on the same day. If the children make a mistake it should be passed over and another test taken. It is a common practice for teachers to correct the mistake, and to take the children over the test two or three times, so that in the end they know it quite well (probably by heart), so that that test is quite useless as a reading exercise in the future. If, on the contrary, each test is sung only once, the same test may be taken a few days later, when it will be found to be, to all intents and purposes, as good as a new one.

Use of the Modulator

As a rule, the modulator is used far too much, as though it were a reading-book, and were an adequate substitute for the reading of actual tests. The uses of the modulator are many, but to act as a substitute for reading-books is not one of them. It may be used with advantage for giving children a short general practice in " mental effects " ; for the practice of a passage which they find difficult when written horizontally ; for showing where and how a new accidental appears in the scale ; and for teaching the notes of a new tune quickly by ear.

[1] Of course no child ever learns to read music as fluently as he learns to read print, simply because the time-allowance for musical reading is so very small. Notation for notation, however, the balance of difficulty really lies on the side of print.

But for whatever purpose the modulator is used, the sequences of notes pointed out should have some musical value; that is to say, the passages should be definite musical phrases, and, in addition, they should be rhythmical. It is unnecessary to find out whether children can sing all kinds of skips which they are never likely to meet with in any ordinary piece of music, and it is bad for their sense of rhythm that they should sing long and aimless strings of notes, when those notes, by being presented to them in the rhythm of an ordinary hymn-tune, might assume some kind of likeness to definite melody. Rhythmical modulator work has also the advantage that it allows of places for simultaneous breathing by the whole class.

The modulator should not be used for voice exercises. These should consist of simple phrases which the children all know by heart, so that their whole attention can be concentrated upon the matter in hand. It is very distracting for them to have to divide their attention between vocalisation and practice in "mental effect."

Sol-fa and Staff Notations

It is of no use to let children stumble on at random, with no method, or a bad one, mixing up all the keys and all the times, and presenting them with the double problem of time and tune simultaneously in early stages. The best results are usually obtained through the use of the Tonic Sol-fa method at first, provided this notation is not looked on as an end in itself, but as a means to teaching the universal notation. The connection between the two notations can hardly be made too soon, and as soon as children are certain of their "mental effects" there is no need to use the Sol-fa modulator any more—unless the children sing from it to the syllable *laa* (a very valuable exercise); but the modulator used should be a staff modulator drawn on the blackboard. The psychological sequences of the Sol-fa method are simple and orderly. The first step of securing a real sense-perception through the ear, not through the intellect, of the character and mental effect of every note in the scale in relation to the key-note is the sound foundation, without which no real musical perception is possible, and no amount of time is wasted

in laying this foundation well and truly. In the same way, the sense-perception of time and rhythm is absolutely essential, and is admirably given by the French system of time-names adopted in the Tonic Sol-fa method. Arithmetical teaching concerning musical time is quite irrelevant till the child feels the beat of the musical measure instinctively and certainly. It is like teaching a child the Greek names of poetic metre at the stage of literary perception where he has not yet felt or noticed the difference between poetry and prose.

Time and Accent

In the Kindergarten or Infant School the children should be encouraged to clap hands or march to familiar tunes, laying strong emphasis on the first of each bar, and marking the weaker accents. The next step is for them to count to this beating, making " one " always come on the strong accent, in order that they may find out for themselves how many beats there are in a bar, and thus determine whether a piece is written in two-, three- or four-time. This leads to the real or instinctive perception of time and accent. Not until this perception has become instinctive is it time to begin to teach the subdivision of the beats by means of the time-names.

Ear-Training

At no time should ear-training cease ; it should begin in the infant school and should form part of every lesson right up the school. Much time is saved, and more practice given if the children write down their tests, when the element of competition introduced is found to be very stimulating. Another, and very valuable form of ear-test is to make the children write out, in either notation, some tune which they know, at first in tune only ; afterwards, in the higher classes, in both time and tune.

The time at school is none too long for acquiring real ease in sight-reading, familiarity with the large literature of traditional music in unison, ease in writing at dictation simple tunes and chords ; and this is the foundation on which, in the years following school time, any further musical education of which the pupil is capable can be based.

Conclusion

In conclusion, it may be of interest to note a word of profound wisdom on the nature and purpose of the study of music in school life, words which open up a wide vista to any one interested in educational theory, and give to the music-teacher in particular a high standard to attain :

" After all, the very word music is derived from ' Musa,' a source of inspiration. Anything which is taught so as to bring the pupil under orderly inspiration is, properly speaking, Music. The great original artist, be he poet, composer, inventor of dances or gymnastics or of mathematical notations, is one so sensitively organised that his consciousness responds of itself to Nature's rhythmic beats, and who also knows how to express his experiences in some way which sets others, originally less in tune than himself, thrilling in response to her by sympathetic contagion from himself. Every notation is essentially a mode of registering and conveying from man to man some form of experience of Nature's rhythmic movements. The man who invents a notation does so because he has felt the rhythm which it expresses. If education were truly understood, the whole life of a school-child would be music.

" In the case of most of the notations, teachers do not know how to use them so as to set the child's mind vibrating in response to the mind of the inventor. Our present methods of teaching the use of scientific notations is like teaching, *ab extra,* the laws of counterpoint to pupils, whose own mode of expression is confined to the use of a dumb piano.

" We do not yet know how to set up the rhythmic response to Nature except in the two departments of sound and muscular motion—that is, of song and gymnastic.

" In these two departments, therefore, we are able to show the rising generation a standard of what all education might and should be."

TEXT-BOOKS

Plato's Republic. Book III.
BATES: *Voice Culture* (Novello & Co.).
VERNHAM: *The Boy Voice* (Metzler).
CURWEN: *Standard Course in the Tonic Sol-fa Method* (Curwen & Co.).
HARDY: *Practical Lessons in School Singing* (Curwen & Co.).
GOMME & SHARP: *Children's Singing Games* (Novello).
MACMILLAN: *Swedish Game Songs* (Macdougal).
Journals of the Folk Song Society (19, Berners Street, W.).
The National Song Book (Boosey & Co.).
SHARP: *Folk Songs of England* (Novello & Co.).
HADOW: *Songs of the British Islands* (Curwen & Co.).
O'NEILL: *A Song Garden for Schools* (Edwin Arnold.)

VIII

THE TEACHING OF DOMESTIC SCIENCE

By Miss Lilian Whitling

Examiner of Training Schools for Teachers of Domestic Subjects

AND

Mrs. Pillow

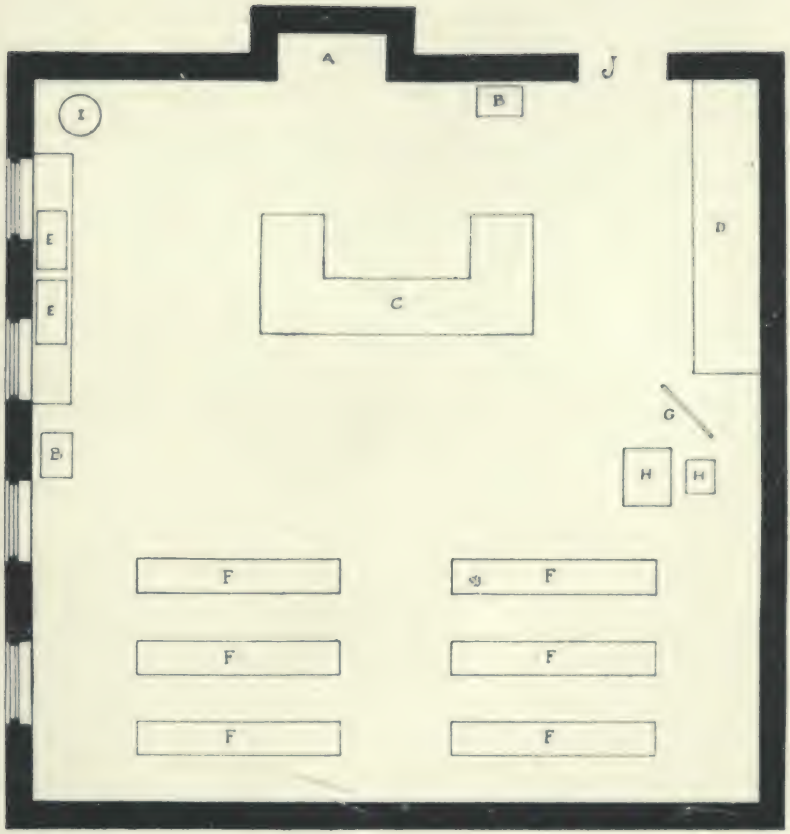
Examiner to the Board of Education of Teachers in Training for Diplomas in Domestic Sciences

Section I.—Introduction, and The Adoption of Domestic Subjects

Its Imperial Importance.—Amongst the many educational developments of the last century, that of the training of girls in the Domestic Sciences may be reckoned as one having the greatest imperial importance. Woman's outlook and position in industrial, professional and social affairs, have undergone much change and advancement, but no matter in what sphere of life she moves, there is no branch of education more urgently needed than that which gives her the knowledge of how to govern her own particular little corner of the world wisely, healthfully, and with a true economy.

Difficulties.—The adoption of domestic subjects is in many cases a matter of difficulty, owing to the fact that but few school buildings possess the necessary accommodation. Special buildings have therefore to be erected to meet the requirements of the educational authorities.

Centre System.—To provide every elementary school with domestic subjects class-rooms would be impossible, therefore schools situated at convenient distances from one another are grouped together, so that classes from these contributory schools can be arranged for in one special building on fixed days and hours.



PLAN OF A COOKERY CENTRE

At the Northern Counties Training School of Cookery, Newcastle-on-Tyne

A. Coal Cooking Range on East Wall.
B. Gas Stoves.
C. Table with Drawers in it.
D. Table with Cupboards underneath.
E. Sinks.
F. Children's Desks on Stepped Platform.
G. Blackboard.
H. Desk and Chair for Teacher.
I. Saucepan Stand.
J. Door.
Four Windows on North Wall.

Rural Districts.—It is, however, exceptionally difficult to carry on the work of instruction in rural districts, for the centre system is only suited to places which are either populous, or in which communication is sufficiently easy to allow of children from contributory schools being easily collected.

Unless this is possible, even under the most favourable circumstances, the centre could only be used for a very few classes per week. In some country places the consent of the Board of Education may be gained for the erection of buildings of a temporary, inexpensive type, such as iron buildings, and also their sanction to schemes whereby classes in domestic subjects and manual instruction, such as woodwork, may be accommodated under one roof. This plan has been successfully adopted in the county of Surrey. It would seem desirable that some of the conditions of the Board of Education be modified for remote villages, otherwise, as at present, in hundreds of them no domestic subject other than needlework can be taught. This is specially regrettable, for, owing to low wages, a limited variety of foodstuffs, and absence of opportunity of carrying on any form of education after school age, a simple practical training in the work of the home is equally, or even more necessary, than for those living in urban districts.

Peripatetic Teachers.—In many outlying places the only chance of girls receiving this kind of instruction is for the county educational authorities to employ peripatetic teachers, who travel by road, rail, cycle, or even motor from village to village. These teachers are, however, liable to be seriously hampered in their work by their slight opportunity of learning to know the children and the conditions of their home life, and also by the inefficient equipment of the school class-room, or even non-arrival of stove, utensils or ingredients.

Limited Diploma for Cookery.—One of the chief obstacles encountered by rural county councils is the difficulty of obtaining fully qualified domestic science teachers for their scattered schools, owing to the expense. The Board of Education, recognising this difficulty, permits in such cases a certificated teacher on the ordinary staff of a public elementary school to be regarded as qualified to give instruction in cookery to the scholars

of that particular school, providing she has been trained in some recognised Training School of Cookery for not less than 280 hours. In Westmorland, representations have also been made to the Board in favour of local authorities in remote rural districts being allowed to submit general schemes for instruction in domestic and similar subjects, the Board being asked to give a block grant for the whole of the work. Such schemes were to provide the use of kitchens, if possible, for practical work, or in places where numbers were exceptionally low, for the teaching to be undertaken by mistresses of the school who were interested in the work, though technically unqualified. It is urged that what was lost by not having a specially qualified teacher would be gained in the close association of the work in domestic subjects with the general work of the school. In the hands of very intelligent and efficient teachers this might prove to be advantageous.

Disposal of Food Cooked: Self-supporting Classes *versus* Efficient Instruction.—The disposal of the food cooked at the cookery classes often presents a serious difficulty to the teacher. The local authorities are often possessed with the desire to make the classes financially self-supporting, and they are apt to put undue pressure on the instructress to urge her to make the sale of the prepared food cover the expenditure upon the material. Not unfrequently the result is that the less useful dishes, such as cakes, biscuits, pastries and such-like are made over and over again, while the more important soups, stews and vegetables, etc., are neglected, because they do not command such a ready sale. It was hoped that this serious evil might be remedied, by requiring that detailed syllabuses of the cookery courses be submitted to the Board of Education's women inspectors; but though this regulation has done good, it is found in some cases that the approved syllabus is not adhered to strictly. The sale of food must, of course, be encouraged, the dishes being sold at cost price, and it is legitimate to take orders for any dishes, providing that they are taken in proper rotation from the approved syllabus, not introduced to meet some special need. Sometimes it is quite possible to provide dinners for members of the school staff, or scholars who do not wish to return home for their midday meal. This scheme, if well

organised by the teacher, is usually found highly popular, and successful. Often two or three of the cookery-class girls stay in school to help serve and clear away the dinner-things, in return for their dinner. This affords the teacher an excellent chance of giving useful hints in serving the food hot and in a refined manner. No matter, however, what the scheme for using the cooked food may be, the primary object of the classes must be educational, and no system of sale effected that may be in any way detrimental to the teaching.

Section II.—Present-day Facilities for learning Domestic Subjects

"Cottage Homes," "Model Homes or Houses," are some of the names given to the small houses acquired by various county councils, in which combined domestic subjects are taught to girls during, or just after completing, their compulsory attendance at school. The Surrey Education Committee have now three of these cottage homes at Sutton and Thames Ditton, in which ten girls during the last six months of their school career are placed under a resident teacher in each home, and are trained by her in the duties of household management. These homes are furnished and conducted as far as possible on the lines of an ordinary dwelling, in order that the instruction may be of real practical value to the girls in after life. In the North, in Liverpool, a school on similar lines has been established at Everton, but it is intended for girls over fourteen, who have left school. The year is there divided into three terms of fifteen weeks each. Each term completes a three weeks' full course of instruction in five subjects—viz. cookery, laundry-work, needlework, dressmaking, and housewifery, together with lessons on health, thrift, and reading from standard books. The scholars pay £1 per term, and 4*d.* per week for needlework materials, but the garments made by the girls are taken home by them on completion. No charge is made for a substantial daily dinner. The hours are from 9 a.m. till 4 p.m., with an hour's break for dinner. The Battersea, Northern, Borough, and South-Western Polytechnics have similar day schools of Domestic Science. The girls must have left school and pay a fee of about £2 per term, the full

course extending over about forty weeks, that is, a period of three terms of thirteen to fourteen weeks each. Following is the time-table followed at The Battersea Polytechnic.

DAY SCHOOL OF DOMESTIC SCIENCE TIME-TABLE

Time.	Monday.	Tuesday.	Wednesday.	Thursday.	Friday.
9.30—10.30	Cookery.	English Literature.	Needlework.	Dressmaking.	Dressmaking.
10.30—11.30	,,	,, ,,	,,	,,	,,
11.30—12.30	,,	Housewifery.	Mending.	,,	Mending.
2—3.30	Hygiene and First Aid.	Cookery	Cookery.	Laundry-work.	Laundry-work.
3.30—4.30	Drill.	,,	,,	,,	Housewifery.

Space renders it impossible to touch on more of the numerous facilities now offered throughout the United Kingdom to girls and women of every class to acquire a practical knowledge of domestic matters.

Section III.—Teaching Domestic Subjects in Elementary Schools

Great advance has been made in this branch of education, although there still remains very much to be done, especially in rural districts.

The most workable plan for Cookery, Laundry and Housewifery is to have (*a*) Classes of two and a half hours in length divided as follows: Theory and Demonstration about forty minutes, Practical work about fifty minutes, during which ten minutes may be spent in copying notes—sixteen classes being necessary to comply with the Board of Education's regulations of at least forty hours' attendance; *or* (*b*) Fourteen classes of three hours' duration, divided into Theory and Demonstration about forty-five minutes, Practical work about two and a quarter hours, during which ten minutes may be spent in copying notes.

If only classes of two hours' duration are possible, then twenty classes will be necessary, divided into thirty minutes' Theory and Demonstration and one and a half hours' Practice, during which ten minutes may be spent in copying notes. This plan still makes the combined classes possible, the old-fashioned scheme of two hours' Demonstration and two hours' Practice

A LAUNDRY ROOM
National Training School of Cookery, South Kensington

A COOKERY ROOM
National Training School of Cookery, South Kensington

DRESSMAKING ROOM, BATTERSEA POLYTECHNIC, LONDON

DOMESTIC SCIENCE STUDENTS AT WORK IN PRACTICE KITCHEN, BATTERSEA POLYTECHNIC, LONDON

being universally condemned. It is best not to have a fixed time for copying notes, but to fit them in when opportunity arises during the Practical work, and as quickly as is compatible with reasonable neatness and intelligible writing. Again, should the Practical work to be done require a long time in which to complete it, it is wise to demonstrate the working, first touching on the principles, then allow the class to prepare and begin their specimens, after which the remainder of the theory, etc., can be expounded. Unless this is done it is often impossible for the work to be actually accomplished during the lesson.

This plan also does away with the danger of allowing the girls to stand for too long a period.

Syllabuses.—One serious defect in the teaching of domestic subjects has been its insufficient adaptation to the practical requirements of the class of homes from which the average type of elementary school girl is drawn. There has been frequently a tendency to teach unsuitable dishes, or methods, that the conditions of the home render impossible ; or too expensive materials are provided, unnecessarily elaborate apparatus, or but small regard paid to local food supplies or conditions. Such defects render much of the instruction given to elementary scholars inefficient, and many of them would be altogether eliminated if domestic-subjects teachers could acquire more insight into the ordinary conditions of the homes of the ordinary working people, and could thus realise that the cooking apparatus is not usually a flawless kitchen range or immaculate gas-stove, but probably an open fire with a small badly heated oven, or perhaps no oven at all. Girls should be encouraged to continue their domestic work after school age, and to learn more advanced methods, with the view of developing the same in a professional manner, or in the hope of better times to come; but at first the lessons must be of the simplest, homeliest type imaginable. Teachers when drawing up syllabuses must arrange the lessons so as to include demonstration and practice as well as simple theory. At least half the time must be spent by the pupils in actual practical work. It is helpful to plan the lessons for an imaginary family of six persons, with a weekly income of the same amount as the average working man in the locality of the school. The lessons must

be most carefully, graduated, and each should have reference to some principle, with practical examples to illustrate the same. Too much importance cannot be attached to suggestions from the teacher as to what homely cheap substitutes can be used in place of her, perhaps necessarily, more elaborate apparatus and material —*e.g.* clean empty tins with holes punched in the lids for flour dredgers; sifted ashes for brickdust; corks dipped in sifted ashes in place of knife-boards and knife-powder, etc. etc. It is wonderful how ingenious teacher and class will become if only the right aim is kept in view. No syllabus should be reckoned complete for two courses of cookery that does not include (1) management of coal, gas and oil stoves; (2) choice, care and cleaning of kitchen utensils; (3) hints on true economy in marketing; (4) simple explanations of the need of food—what uses different foods have in the body, and how foods if wisely chosen will prevent disease; (5) the principles of and rules for boiling, steaming, stewing, baking and frying different foods, with homely dishes made to illustrate each cookery method; (6) foods to be used in place of meat; (7) hints on preparing, packing, carrying and keeping hot, portable dinners; (8) rules and recipes for feeding and cooking for the sick and convalescent; (9) arranging and calculating family meals for a week.

How to Draw up a Syllabus.

SUBJECT:—COOKERY

First Year's Course.
Number of Lessons, 16.
Duration of Lesson, 2½ *hours.* *Day and Hour Class meets.*

Lesson	Subject of Lesson.	Practical Illustration.
1	Object and Value of Instruction in Cookery. Management, cleaning, and lighting of cooking-stove. Cost, care, and cleaning of necessary utensils.	Examination of stove and its different parts. Cleaning stove; lighting fire. Cleaning saucepans, knives, tins, pastry-boards, etc.
2	The Need of Food. Choice, cost, and boiling of vegetables in common use.	Boiling potatoes, green and root vegetables.
3	Uses of different foods in the body. Boiling puddings containing suet, flour, and fruit.	Suet pastry made into apple-pudding and dumplings for soup, etc.
4	Choosing foods wisely, to prevent disease. Boiling fish; sauce containing fats.	Boiled cod, skate, or cheap varieties. Plain fish sauce. Extra dish for revision: boiled potatoes.

How to Draw up a Syllabus—*Continued.*

Lesson	Subject of Lesson.	Practical Illustration.
5	Rules and principles of boiling meat. Suitable joints, cost. Economical additions to meat. Utilisation of pot liquor.	Boiled meat. Dumplings and vegetables. Simple broth.
6	Principles and advantages of steaming foods.	Potatoes. Simple pudding.
7	Stock and Soup. Principles. Value as food.	Bone Stock. Lentil Soup. Toast.
8	Principles and economy of stewing foods. Suitable parts of meat.	Stew of meat with unthickened gravy cooked in (*a*) saucepan, (*b*) the oven.
9	Stewing of vegetables, fresh and dried fruits.	Stewed onions, rhubarb, prunes with boiled rice.
10	Baking. Management of fire and oven. Suitable joints. Cost.	Baked joint and potatoes. Gravy. Clarified dripping. Revision.
11	Baking. Principles of making milk puddings. Value of milk as food.	Rice and semolina puddings.
12	Principles of Pastry-making. Why fat is used.	Short pastry; fruit tart and jam tartlets.
13	Baking bread. Simple explanation of yeast; its action.	Yeast rolls. Revision.
14	Shallow frying. Advantages and disadvantages.	Sausages or fish, bread, potatoes.
15	Invalid Cookery. Its important points needing care.	Beef tea. Gruel. Baked custard.
16	Suitable food for infants from birth to dentition. Good and bad types of feeding bottles. Care and cleaning of the same.	Cleaning feeding bottles. Preparing the food. Filling bottles. Barley-water.

Unless the local educational authorities can arrange for girls to attend at least two courses in cooking, or one in cooking and one in housewifery, the classes on Invalid and Infant Feeding included in the Model Syllabus should *invariably* be included. This is most necessary, for thousands of girls attend one course only, and leave school without the smallest instruction on these most important of all subjects.

Colonial Housewifery.—With a view to the increasing number of girls who nowadays emigrate, it would be of immense value to them in after life, to give instruction in what might be termed Colonial Housewifery—*e.g.* the substituting of baking powder for yeast, the preparation of home-made yeast; condensed milk, sweetened and unsweetened, instead of cow's milk, and how to remedy its frequent deprivation of the fat of milk; baking meat, bread, pastry, etc., in an iron baking pot put on the fire, with a flat lid in which to pile hot cinders; the proper cooking of dried vegetables and fruits, and care in selection and treatment of canned foods. Cakes should be made without eggs, or with

dried eggs in powder, and the teacher should also contrive to demonstrate quite practically, making fires out of doors, and cooking meat, etc., by the most primitive methods with makeshift utensils. The possibilities of rubbing clothes on smooth rock or stones instead of washing boards, and doing without a mangle, can be explained, as well as the use of the gum which exudes from, and is picked off various trees, instead of starch or the gum arabic of the chemist. Sifted wood ash is an effective substitute for hearthstone, or the same mixed with a little water replaces the whitening of civilisation. Colonials will tell you that freshly cut grass serves as well as tea-leaves for laying the dust when sweeping, and has the advantage of giving a delightful fragrance and freshness to the air.

Infant Care and Management. — In the end of 1910 the Board of Education issued a memorandum to the members of local education authorities and teachers of public elementary schools urging the need of improving and increasing the present inadequate provision made for instructing girls in the management of infants. The Memorandum, which is signed by Dr. Janet Campbell, M.D., Medical Department, Board of Education, suggests a course for use in elementary schools, most of which is included in Housewifery courses; but for girls from 12 to 14 years of age, stress is laid on the lessons in which instruction is to be given on how to wash and dress a baby; its clothing, food, how much cow's milk the infant requires, how the bottle should be prepared at 3–6 and 9 months of age; how to prepare barley-water and whey; when barley-water is permissible, and the character of such food; why patent foods are to be avoided; the signs, and importance of noticing digestive troubles, such as vomiting, wasting, etc.; how much sleep is needed; how to provide a comfortable and suitable cradle; the need of fresh air and sunshine, and danger of draughts and cold; the training of infants in cleanly and regular habits, and the risks of the condemned "comforter," etc.

Teachers would do well to obtain and study this lengthy memorandum (Circular 758).

The Aim of Domestic Science Instruction.—The aim of all teaching in homecraft must be not only to give so many lessons

in cooking, plus so many more in laundry-work and a few more in housewifery, working from a stereotyped syllabus with its headings of rules and examples; but to impress the fundamental *principles* of the new matter, and that the same will apply to more than the one or two illustrative examples that it is possible to demonstrate in the class—*e.g.*, that if the whys and wherefores and processes are understood of boiling one pudding or washing one flannel garment, it is possible by using intelligence and memory to boil any pudding or wash every variety of flannel attire.

Endeavour must be made to develop reasoning power, initiative, common sense, and self-reliance of the pupils, no matter if the finished results are somewhat less perfect than would be the case if the girls worked mechanically at the expense of the teacher's brain, not their own. Manipulative skill must not be gained at the expense of true knowledge.

Then again, though the domestic surroundings of the working classes are often terribly amiss, yet prospective housewives can be taught such simple sanitary science as will show them what true cleanliness really is, the value of boiling water as a cleansing agent; the best methods to use to prevent needless waste through tainting of meat, souring of milk; and the harmful results of the indiscriminate use of newspaper, paper bags and the oddments children are allowed to pick up in the street and play with.

SYLLABUS FOR FIRST YEAR'S INSTRUCTION IN LAUNDRY-WORK

Number of Classes, 16.
Duration of Lesson, 2½ *hours.*

Lesson 1. The importance of Cleanliness. Cost, care and use of laundry utensils, including mangle.
,, 2. Preparations for washing day. Economy of repairing clothes before and after washing. Preparation of dissolved soap.
,, 3. Principles of washing woollens. Use of ammonia.
,, 4. Washing woollens.
,, 5. The processes of steeping, washing, boiling, rinsing, bluing. Preparation of the copper.
,, 6. Washing white clothes.
,, 7. Drying (*a*) indoors, (*b*) outdoor.
,, 8. Damping, folding and mangling. Precautions when using mangle.
,, 9. Cost and care of heating irons. Plain ironing. Management of fire.
,, 10. Heating irons by gas. Treatment of new and rusty irons.
,, 11. Use of soda for greasy articles.
,, 12. Importance of airing clothes. The storing of clean linen.

Lesson 13. Reasons for starching articles. Cost and quality. How to make boiling-water starch. Use of borax and wax.
,, 14. Principles of washing coloured cotton articles. Use of salt and vinegar. Action of acids and alkalis.
,, 15. Cold-water starch. Use of turpentine.
,, 16. Washing and finishing white and cream lace. Preparation and use of gum-water or borax.

SYLLABUS FOR FIRST YEAR'S INSTRUCTION IN HOUSEWIFERY

Number of Classes, 16.
Duration of Lesson, 2½ *hours.*

Lesson 1. The importance of a clean, healthy, comfortable home. The value of being methodical. The principal apparatus and materials needed for keeping the house clean.
,, 2. Warming the house. Cleaning and management of kitchen stove and sitting-room grate. Economy of fuel. Importance of fire-guards.
,, 3. Cleaning iron, steel and brass.
,, 4. Value of light and fresh air. Means of ventilation. Importance of airing rooms, beds and clothing. Effects of a badly ventilated room by day or night.
,, 5. Lighting the house. Choice, cost and care of lamps, candlesticks. Management and economy of gas (towns only).
,, 6. Cleaning unpainted woodwork. Removal of grease marks. Economy of soap.
,, 7. Cleanliness of body, teeth, clothes, food, particularly of water and milk, as necessary for health.
,, 8. Method in work, planning out the day and work to economise time and labour. Correct method of turning out a room.
,, 9. Dangers to health of neglected sinks, baths and lavatories.
,, 10. Disposal of kitchen refuse. Management of dust-bin. Good and bad types.
,, 11. Washing china, cleaning copper and tin.
,, 12. Choice, cost and care of carpets and linoleum.
,, 13. Making the most of weekly income. Simple form of accounts. Cleaning glass.
,, 14. Cleaning silver, white or plated metal.
,, 15. Hints on marketing and true economy. Laying the table for meals.
,, 16. Simple home remedies. Treatment of burns, cuts, colds. What to do in case of fire or a person in flames.

SYLLABUS FOR A COMBINED DOMESTIC ECONOMY COURSE AS ARRANGED BY THE SURREY EDUCATION COMMITTEE

Ten girls to attend for ten weeks during the last six months of their school life.
Hours, 27½ per week } 9.30—12.30 p.m.
5½ ,, day } 2—4.30 p.m.
Mornings—Chiefly practical work.
Afternoons—1 hour demonstration and notes on cookery, housewifery, laundry and hygiene; 1½ hours needlework; ironing; or washing dinner dishes, etc.

The Daily Work of the ten Girls:

1. Is Cook (the same girl for four days). She buys and prepares dinner for eleven persons.
2. Is Kitchenmaid.
3. Parlourmaid. Cleans sitting-room; lays table; answers door.
4, 5, 6, are Housemaids. Clean bedrooms; bathroom; hall; also such items as cleaning lamps, silver.
7. Class-room maid. Cleans class-room and makes bread.
8 and 9. Laundrymaids.
10. Sewing, upholstery, etc.

In this model home there are three resident teachers, all occupying separate rooms. The entire laundry-work for the household is done by the girls, and they also keep the actual accounts of the house, and each is responsible for her own department. Besides the actual cooking of the daily dinner, instruction is given in making bread and cakes; invalid cookery, jams, marmalade, and pickles; preservation of eggs, and a thorough knowledge of the cleaning and management of cooking stoves.

Four Family Budgets.—It is no easy matter for those who are endeavouring to devise and suggest better and more scientific methods in the homes of the working classes, to calculate the average sum possible for the housewife to spend on food and various other items. The following accounts actually kept by four women, who all received 22*s.* per week out of their husbands' earnings of 24*s.*, may be helpful. The family consisted of seven in each case.

No.	Rent, Fuel, Clothes, Lights, Insurance, and Cleaning Materials.	Food.
	s. *d.*	*s.* *d.*
1.	10 0	12 0
2.	11 7½	10 4½
3.	11 10½	10 1½
4.	10 7	11 5

These sums show that in even the largest amount spent on food—viz. 12*s.*—the food allowance per head is only a fraction over 1*s.* 8½*d.* per week. It is often impracticable to arrange entire dinners for such small sums at the ordinary cookery class, on account of having sufficient work for the scholars, but much good may be done by planning the use and introduction of various ingredients and combinations of foodstuffs, the recipes for which rarely appear in cookery books. Among these may be mentioned the use of skim or "separated" milk, though not for infants or young children; the use of a *very little* meat with plenty of haricot beans, lentils, or rice; baked bacon or pork with onions and potatoes; the possibilities of a sheep's head, the broth thickened with oatmeal, and good family stews, consisting largely of vegetables, dumplings and a few "butcher's pieces," all cooked in one pot on any kind of open grate.

Friction has often arisen between teachers and school managers on the equipment of a cookery class-room when it is necessary to exercise great economy. The teacher not unnaturally has a tendency to err on the side of quantity and quality, while managers and educational committees refuse even reasonable demands for utensils and ingredients on the ground that nothing of a similar nature would be used in the homes of the children. To work harmoniously the teacher must subdue her desire for an attractive model kitchen, and the educational authorities must recollect that eighteen girls cannot be trained simultaneously and elevated above the unintelligent and often slovenly and needlessly exhausting methods of their homes without adequate apparatus and material.

List of Cooking Utensils.—The following list of really desirable utensils may be of service to some. It will be understood that prices vary with locality, also that all the items may easily cost more and in some cases less.

Crockery.

18 pudding basins (1 gill), 6 (½ pint), 4 (1 pint), 18 pie-dishes (1 gill), 6 (½ pint), 4 (1 pint), 18 mixing basins, 3 large basins, 6 meat dishes, 12 plates, baby's bottle (good type), baby's bottle (bad type), 2 teapots, 4 cups and saucers, 6 hotpot dishes, 4 tumblers, 3 jugs.

Ironmongery.

Set of skewers, spring balance scales, 18 small baking tins, 4 meat tins, 2 fish slices, 3 meat trivets, 2 galvanised baths (different sizes), 4 small galvanised pails, 1 large iron saucepan, 4 smaller ones, 2 medium, 2 large enamel saucepans, 4 smaller ones, 1 oval iron boiling pot, 1 fish kettle, 1 steamer for 4-quart pan, 4 small frying pans, 1 larger one, 4 small bread tins, 1 Dutch oven, 1 kettle, set of measures (3), 1 meat chopper, 1 bread grater, 1 gravy strainer, 1 funnel, 1 wire sieve, 1 enamel colander, 1 meat saw, 36 patty tins, 2 tin pepper pots, 1 pair scissors, 12 iron tablespoons, 6 teaspoons, 18 small steel forks, 18 small knives, 1 toasting fork, 6 tin plates.

Turnery.

18 small pastry boards, 18 small rolling pins, 18 wooden spoons, 2 pastry brushes, 4 scrubbing brushes, 1 roller towel and bracket fixture.

Practical Hints on the Management of Domestic Classes in Elementary Schools

1. Provide a fire-blanket, carron oil, rags, etc.

2. Let the pupils work separately, otherwise the quick girl will do all the work.

DOMESTIC SCIENCE STUDENTS IN CHEMICAL LABORATORY,
BATTERSEA POLYTECHNIC

STUDENTS' IRONING ROOM, NATIONAL TRAINING SCHOOL OF COOKERY
LONDON

3. See that each pupil is provided with an apron and sleeves, and that her hair is tied back.

4. See that ironing stoves and cooking ranges are protected effectively by fire-guards.

5. Fire-drill should form part of the routine of all domestic economy classes.

6. Teachers are expected to pay special attention to ventilation, and a thermometer (1s.) should hang in every class-room.

7. Simple, well drawn and coloured diagrams, intelligently used, are valuable aids to both teacher and class.

8. Provide the needful number of collars, cuffs, fronts, blouses, handkerchiefs and articles of underwear for use in laundry classes, and reckon them as stock; it is not advisable for the scholars to bring their own to be washed.

9. Teachers should use their influence and impress the class with the need of dressing suitably for their work, removing rings or bangles, and avoiding lace on their sleeves, and so forth.

Section IV.—Instruction in Secondary Schools

In April 1909 the Association of Teachers of Domestic Subjects issued, for use in secondary schools, the following proposed syllabus, intended to cover those portions of general elementary physics, chemistry and laws of health, of which it is necessary to have a knowledge for the intelligent interpretation of the daily phenomena and processes connected with home life. At present, out of about sixty-six Public Secondary Girls' Schools in London, only about twenty provide special instruction to prepare their pupils for home life. The Clapham High School is one of those that have lately taken the matter up very keenly, and now the domestic arts form part of the fifth-form curriculum and are taken by the class as a form subject.

Proposed Syllabus issued by the Association of Teachers of Domestic Subjects

A. Physics.

Metric System: Measurement of length, area, volume, mass density, pressure of atmosphere; the barometer.

Heat Temperatures: the measurement of temperature; thermometers; effect of change of temperature on—

(*a*) Volume.

(*b*) State: (1) boiling-point, (2) melting-point. Latent heat. Specific heat.

The Transference of Heat:

(*a*) Conduction.

(*b*) Convection.

(*c*) Radiation.

B. Chemistry:

Chemical Action—examples of chemical changes as distinguished from physical or mechanical change.

(1) *Air.* Composition of air, the chief chemical and physical properties of oxygen and nitrogen; impurities in the air.

(2) *Water.* Chemical composition and physical properties of water; its chief constituents. Solution, solubility, distillation, natural waters, hardness of water.

(3) *Common Acids,* as hydrochloric acid, sulphuric acid, nitric acid, and their principal derivatives.

(4) *Ammonia* and its principal salts.

(5) *Carbon.* Forms of carbon, oxides of carbon, carbonates, chalk, lime, combustion, flame, Bunsen burner, coal gas.

(6) The outlines of chemical theory, chemical action, atomic theory, symbols and formulas.

(7) The chief common sugars. Starch, fermentation, alcohol. The chief common fatty acids, the principal oils and fats. Soaps.

C. Laws of Health.

1. *Physiology.*

(*a*) Respiration, difference between inspired and expired air.

(*b*) Air circulation.

(*c*) Digestion. Function of food.

2. *Hygiene.*

Air: Ventilation.

Water: Storage, contamination, purification.

Food: Relative value under various conditions, *i.e.* milk, eggs. Micro-organisms affecting the composition of food-stuffs. Sterilisation and preservation of foods, meats.

Rest and exercise, cleanliness, clothing, sanitation.

Domestic Science is taught in the secondary schools under the Bristol Education Committee, and below is given the time-table of their scheme.

BRISTOL SECONDARY SCHOOLS DOMESTIC SCIENCE TIME-TABLE

Mondays:	
10—10.45	Hygiene Lecture (VI. Form, B and C).
11.45—12.30	Practical Hygiene (VI., C).
2—3 and 3—4	Hygiene and Physiology (Theoretical and Practical).
Tuesdays:	
9.10—10	Domestic Science (V., A, B, C).
10—10.50	Sewing.
11.45—12.30	Cookery.
2—2.45 and 2.45—3.30 ..	Cookery and Dressmaking on alternate weeks (IV., B).
3.30—4.5	Theoretical Hygiene (V., C).
Wednesdays:	
11.45—12.30	Cookery and Sewing (III., B).
3.15—4.15 and 4—5 ..	Domestic Science and Sewing (VI., B and C).
Thursdays:	
9.10—10 and 10—10.50 ..	Cookery and Sewing on alternate weeks.
11.45—12.30	Theoretical Hygiene (V., A and B).
2.45—3.15 and 3.15—4.15	Cookery and Dressmaking (IV., C).
Fridays:	
11—11.45	Hygiene (VI., B).
11.45—12.30	Practical Physiology.
2—2.45	Laws of Health.
2.45—3.15 and 3.15—4.15	Cookery and Dressmaking on alternate weeks (IV.).

IX

THE TEACHING OF NEEDLEWORK IN ELEMENTARY SCHOOLS

By M. W. Arnott, L.L.A.

Lecturer on Needlework to Edinburgh Provincial Committee

For many years great disappointment has been felt and expressed on the results of the teaching of needlework in our schools. The issue recently by the Board of Education of *Suggestions on the Teaching of Needlework in Elementary Schools* (Circular 730) introduces a decided change in the treatment of that subject. The Circular, which is rather drastic in character, must have been a source of satisfaction to those teachers who have been experimenting along the lines now suggested. The opening paragraph shows the tenor of the whole Circular :— "It may be doubted if Needlework has ever yet taken its proper place in the curriculum of Elementary Schools, for its educational, as distinguished from its merely practical, value has been almost entirely lost sight of"; and the *Suggestions*, if followed out, should bring the teaching of needlework into line with the more intelligent treatment the other branches of educational handwork receive. Of course, the Circular applies to England alone, but we hope that it will not be long before something similar will be issued by the Scotch Education Department.

The *Suggestions* give a clear and concise statement of the aims to strive after—the ends to be kept in view—as well as suggesting the best methods of attaining those ends. Every teacher should have a copy and look upon this article as supplementary to it.

Preliminary Training.—It should be remembered that needlework is a form of hand and eye training, and therefore should

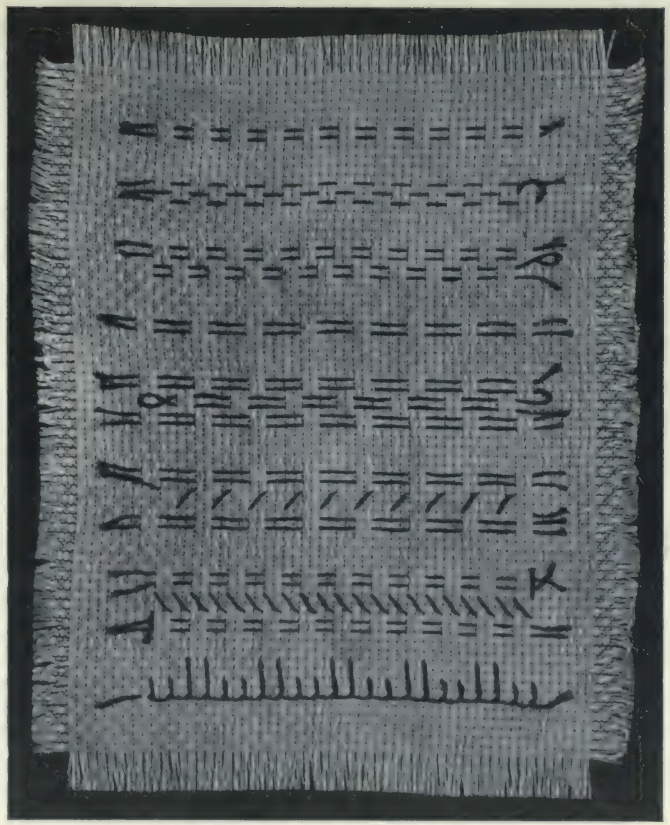


FIG. 1.—RUNNING AND TACKING, HEMMING, OVER-SEAMING, AND BLANKET-STITCH USED AS ORNAMENTAL STITCH ON CANVAS

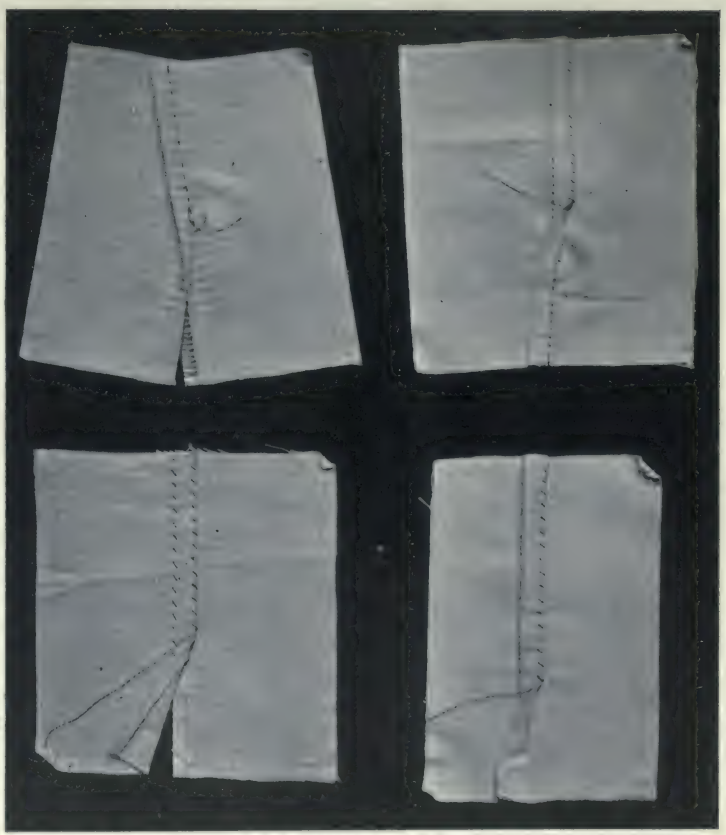


FIG. 6.—METHODS OF JOINING SEAMS BY RUNNING AND HEMMING

a. Double seam or French seam—2 rows of "running."
b. Run and fell—1 row of "running" and 1 row of "hemming."
c. Counter hemming—2 rows of "hemming."
d. Mantua-maker's hem (for fine material) 1 row of "hemming."

Approximately ½ actual size.

Approximately ½ actual size.

be regarded as a continuation of certain occupations of Kindergarten, which are now dropped when the child leaves the infant school only to be taken up some years later. Practice in "cutting" and "paper-folding" should be continuous. Ordinary sewing cannot with safety be taught to children under six years of age without danger of eye-strain, but as "sewing" is an occupation which appeals early to a girl's natural instincts, much may be done in training the child to use a needle in making stitches by the judicious use of coloured material, thick thread or wool (of a contrasting colour), and large wool needles, and that, too, without causing any undue strain. Coarse Java canvas of a soft make in art shades is very useful. Cut into small squares or oblongs, quite a number of small articles can be made. The stitches should be large and used as ornament. The first stitch taught would be the easiest, "running" or "tacking." The straightness and regular spacing of the stitch should be pointed out, and special attention should be paid to the holding of the work and position of the needle, so that nothing is acquired that will have to be unlearned later. A second row of stitches parallel to the first makes a pretty border, and the child should make other combinations for herself. Other stitches could easily be introduced, with the result that the child begins ordinary sewing with a hand able to use a needle in making a stitch with some degree of skill. In Standard I. the hand and eye are by gradual stages accustomed to using the smaller needles and making the smaller stitches required in ordinary needlework. Fig. 1.

Schemes of Work.—Bearing in mind that we want our girls to leave school "handy with the needle," which means able to sew in a quick, strong, sensible style, accustomed to apply it where needed in their own garments, either in repairing or making, trained to judge as to best methods and proper materials, to plan and invent for themselves, and able to cut out their own simple underclothing, we must have a well-considered scheme of work. In drawing out any scheme several points must be kept in mind:

1. **Grading and Grouping of Work.**—The work must be carefully graded from the simplest stitch to the most complicated process. To avoid "multiplication of teaching" the teacher

must thoroughly understand which are the essential principles of her subject and which are the resulting details, and group together those processes or garments which have the same underlying principles, teaching one as a representative of the group, and, if the girls thoroughly learn the one, they will be able to make any others in the group. There is incidentally the additional advantage that every member of the class need not be doing exactly the same work (Cir. 719).

2. **Classification of Children.**—The children should be classified so that all at the same stage of proficiency may be working together. If it is not possible to classify the whole school for needlework instruction, the children of each class should be graded. The quicker workers, or those who may require to wait for help, should not be allowed to waste time—independent work should be encouraged, and knitting should always be kept at hand.

3. **Class or Demonstration Teaching.**—The teaching should always be by the class or demonstration method, and this can only be done with success if 1 and 2 are carried out.

4. **Working "Specimens" or "Tests."**—While a new stitch or method is being taught the child should work with the teacher on waste material, but, as soon as she grasps the method and has obtained some accuracy in working it, all further practice should be got on some article or garment. Further, the practice of the new stitch or method need not be confined to the article or garment she happens to be making in class. Here again encourage independent work—any article of her own choosing. For odd practice in running, seaming, and hemming nothing is more useful than repairing garments, if only those torn in school —slits in pinafores, loose lace, undone hems, tapes a-wanting, buttons pulled off. Encourage the children to sew at home, and if possible to bring what they have done to show.

5. **Size of Garments.**—All the garments made by children should be small. Even in the highest classes, if the girls make garments to fit themselves, they will be as large as they can comfortably handle. A garment, too, which can be finished in a (to the child) measurable distance of time is a source of interest to the end; and when she sees it in use—the thing which *she* made—her immediate ambition is to "do it again." The second

garment should be one of the same group, one which will give further practice in the same methods and stitches as the first, but which, being a different garment, gives the variety which sustains interest. Very often too, where the children have been trained to independent work, another garment will be made, partly at home and partly at school.

The teacher will, of course, understand, and not permit herself to forget, that it is not in the mere making of many garments that the training lies (that would be to overestimate the industrial side of the subject), but by interesting the child, so that she willingly makes two or more small garments for the pleasure of seeing them in use, instead of the one which formerly constituted her session's work. The mind is kept alert and works through the hand, and, while the practice which is necessary to the acquisition of skill is got, mechanical drudgery is avoided.

6. **Use of the Sewing Machine.**—"The use of the sewing machine for long seams and hems prevents much needless repetition in the work of the older girls, and gives time for more useful work in the shape of additional garments" (Cir. 730). Provision must be made for teaching the girls to use the machine.

7. **Correlation to other School Subjects.**—Cutting and paper-folding should be carried on continuously throughout the school for pattern-making and fixing.

Drawing is needed for drafting the patterns and making sketches of the garments.

Arithmetic is used in measuring and calculating, and should be started in the youngest class. As soon as a child can use an inch-tape or ruler, she should be trained to measure the article she is making. If it is only a small square, she should be able to tell that it is, say, 6″ long and 6″ broad. If she gets a piece of cloth to make a bag, and, measuring it, finds it to be 18″ long and 6″ wide, she will discover that it makes a bag 9″ long and 6″ wide. The next step would be to calculate the quantity required to make a bag of a given size. Later, when the girl comes to make garments, she would calculate both quantity and price.

The Demonstration Method of Teaching.—By this method a lesson is taught to the whole class at once, the teacher making

use of special apparatus for the purpose, on which to work stitches. A plain and a chequered blackboard are required for diagrams and sketches, a demonstration frame for working stitches, and large working models for other lessons. The lessons must be carefully prepared, fully illustrated both by models and B.B. sketches and each step patiently demonstrated as often as needful. The teacher must place herself and the apparatus she requires in such a position that every child in the class can see all her movements. Fig. 2.

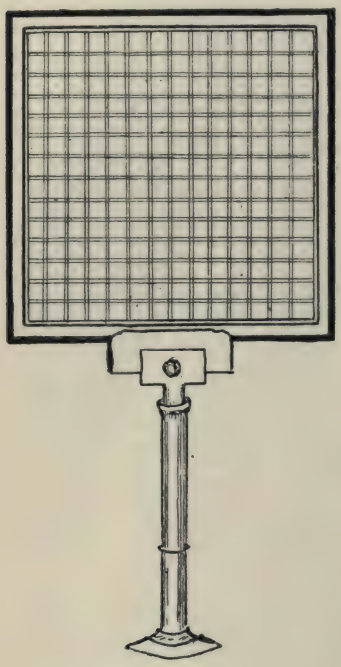


Fig. 2.
Demonstrative Frame.

The models should be large enough to be easily seen by all the class, and they should, if possible, be kept fastened in a frame or pinned up on the B.B. while the teacher is working on them. They should always be left up between each step of the demonstration, so that the children may refer to them.

Often a B.B. sketch is necessary to show in an enlarged form some part of the model which requires particular attention. Diagrams or sketches need not be elaborate, and they are more effective if they are drawn just as they are required for illustration. Of course some, such as those illustrating knitting or darning, must be drawn beforehand.

In lessons which require a distinction to be made between the right and wrong side of the material the use of paper coloured on one side, and white on the other, is a help to clear demonstration. Also, where the lesson involves the placing one piece of white material on another, the piece that is being placed on the garment is more easily seen if it is coloured.

In teaching the lesson the teacher demonstrates on her model while the class carefully watches. Where suitable—as in teaching a new stitch—two or three children should be brought forward to

demonstrate, class still watching. Then the pupils work on their practice pieces, and the teacher watches to find out if it is necessary to demonstrate again. The point should be demonstrated again and again until all can follow. The amount demonstrated at one time will depend on the class and the subject; the teacher is the best judge.

Cutting Out.—Cutting begun in Kindergarten should be continued through all the classes. In the youngest class, practice should be given in cutting along straight lines, either drawn or folded. Squares and triangles could then be cut, and lastly straight edges in calico.

In Standard II. curves could be introduced, first drawing them and then cutting along the lines. Here again the children should be shown how to hold the scissors so as to get a clean edge. The drawing and cutting out of dolls' garments could be made a very useful and interesting exercise in curves. These should be drafted by the same method of folding and proportion that they will use later for their own garments, the only difference being that they measure their dolls for the length of garment instead of themselves.

Each girl in Standard IV. should receive a special notebook, which should be kept until she leaves school, and taken away with her for reference. In it would be drawn the garments that she drafts and cuts out, the amount of material required, the cost, etc., directions for making up the different garments, and notes on the working of any difficult parts.

The drafting of patterns should be by some simple method. The most interesting to the girls is that by paper-folding and proportion based on one measurement. It is at the same time the method best suited for class teaching. For a chemise, for instance, the girls would first measure each other for the length. The width, for young girls, is the same as the length, and the other parts of the garment bear some proportion to the length or width. Fig. 3 (*a* and *b*).

Another advantage of this method is that any kind of paper can be used, even newspaper, but the children must draw their pencils down the lines they fold to distinguish them from folds which may be in the paper.

Those teachers who wish to use this method and have not time to arrange patterns for themselves, will find all they require in Miss Heath's little book on *Pattern-making by Paper-folding*.

The general use of paper patterns now so profusely supplied by almost every woman's paper should not be ignored. The older girls should be shown how to adapt them—where to add to, or take from.

When the pattern is cut out the girl should calculate the quantity of material required and consider the quality suitable.

The cutting out of the garment presents no difficulty.

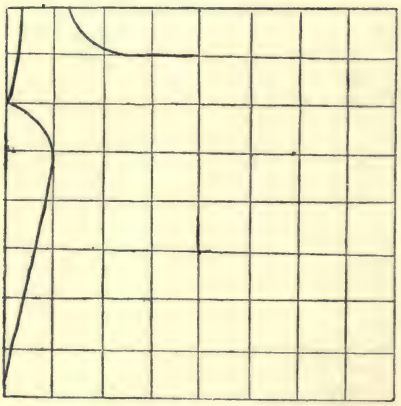


FIG. 3A.—CHILD'S CHEMISE.
Length—Top of shoulder to knee.
Width—Same as length.

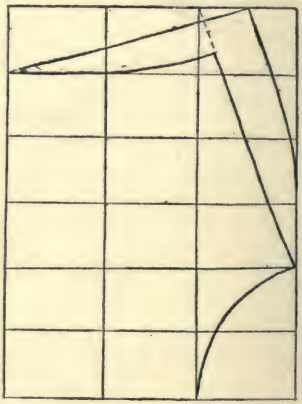


FIG. 3B.—CHILD'S DRAWERS.
Length—Waist (back) to knee or ½ height.
Width—1½ length.

Fixing.—The first stitch the child learns to make is "tacking," and when she doubles her piece of paper or calico, and marks a line for sewing along, she gets her first practice in "fixing." Linked on to paper-folding, fixing brings no new difficulty to the youngest child, and the wonder is that teachers have so long submitted to the drudgery of the preparation of children's work, when, by a little preliminary training, each child could have done her own. With a very little attention and practice the child learns to fold on cloth correctly and quickly. The articles cut in "cutting" practice should be such as can be used in practice of fixing. The small garments suggested for Standard II. and III.

afford variety as well as practice, and form an introduction to the fixing of the larger garments.

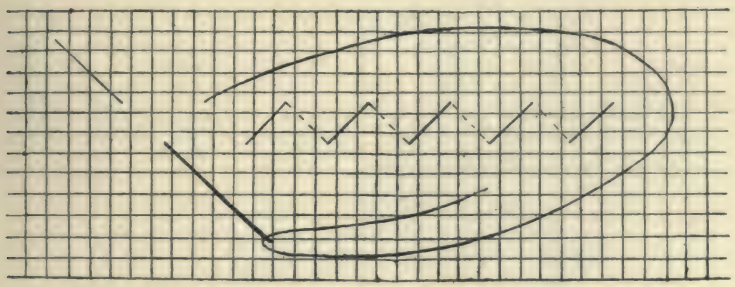


FIG. 4A.—POSITION OF NEEDLE IN MAKING A HEMMING STITCH.

Stitches.—The first stitch to be taught, because the easiest, is "running"—in the form of tacking. The stitch would already have been practised in the infant school, but its use in ordinary sewing as a fixing stitch only would be seen when, after some practice in tacking, the smaller "running" stitch would be introduced, the children realising that the smaller stitch is necessary for strength.

Oversewing and hemming would be next taught, the children being led to understand that "good" sewing consisted in the correct shape and regularity of the stitch, not in the size. Special attention should be paid to the holding of the work and the position of the needle when making a stitch—upon the latter point depends the correctness of shape. Fig. 4 (*a* and *b*). In tacking and running, it is sometimes forgotten that the needle should be put in at right angles to the work.

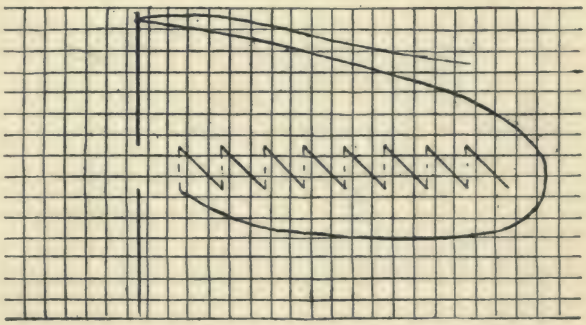


FIG. 4B.—POSITION OF NEEDLE IN MAKING AN OVER-SEAMING STITCH.

Every girl should be able to work smartly a good serviceable button-hole; but it requires a considerable amount of practice. A great deal, also, depends on how it is first taught. The stitch should be taught and practised on

canvas, and then the entire buttonhole. A B.B. diagram as well as the demonstration frame should be used to ensure clearness. Fig. 5 (*a* and *b*). Keeping the canvas buttonhole as a pattern, one on calico should then be practised.

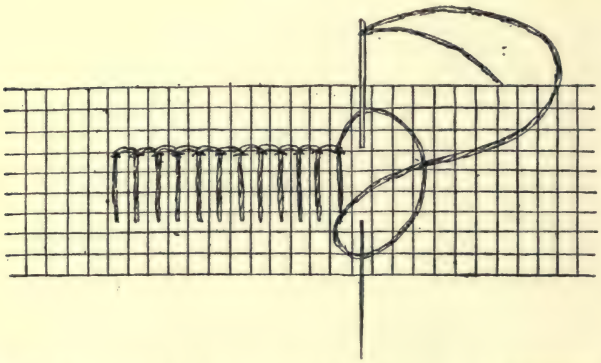


FIG. 5A.—SIDE OF BUTTONHOLE METHOD OF TWISTING THREAD TO MAKE KNOT.

Valuable help in teaching classes the stitches and processes used in making up and mending underclothing is given in *Common-sense Needlework*, by Miss Fleming. The B.B. illustrations are simple and very numerous.

Practice in the simple stitches can be got in the younger classes by making up the dolls' garments. The different ways of joining seams can also be taught and practised, and in a way that keeps the children interested and eager. Fig. 6. Of course, the little garments would be made up without any gathering or pleating of fullness. Small pinafores and overalls of the kimono style are also suitable for practice in the same classes.

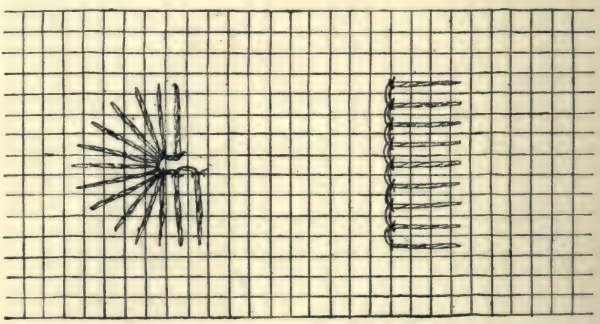


FIG. 5B.—ROUND AND SQUARE ENDS OF BUTTONHOLE.

Mending.—As has been already pointed out, much may be done in the way of teaching repairing of garments and household articles before patching is taught, and at the same time considerable practice in sewing may be got in an interesting way.

In teaching patching it matters little which patch is taken first, although, taken in order of difficulty, it would be flannel, print, calico. The principles of patching should be understood. A worn piece of the garment is to be replaced by a stronger piece of the same material, and it should be done in such a way as not to be easily noticed. Therefore, the material to be added should resemble closely the material which will surround it, the selvedge way of the patch and garment should be in the same direction, and the right side, etc., of both should be together. If these points are thoroughly grasped when the working of one patch is taught, all that is required, when each of the others is being started, is to point out the slight modification in method of working which the different material requires. When working the simple square patch has been practised a little, the children should be led to make practical application. If a patch is required near a seam, as under the arm of a chemise or under-bodice, the seam should be opened and one side of the patch let in. Fig. 7 (*a*). If it is required near a band, the sewing of the band should be unpicked and one side of the patch set in to the band—as in the front of an apron or petticoat, where the patch would be flat, or at the knee of knicker drawers, where it would be gathered before being set in. Fig. 7 (*b*).

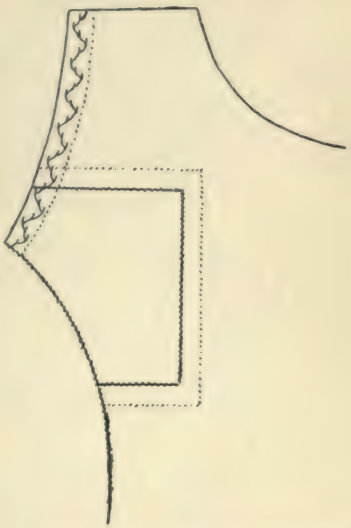


FIG. 7A.—PATCH ON CHEMISE WORN UNDER ARM (FRONT).

FIG 7B.—PATCH ON KNICKERS WORN AT KNEE.

Knitting.—Knitting is really very simple, and can be taught to young children, as there is no danger of straining the eyes. Here again small articles should be made instead of practice pieces or large articles. Knitting the different parts of a stocking is easily learned, if the children are allowed to knit small socks or stockings. Simple patterns of lace add a fresh interest, and girls are delighted to make trimming for their own garments in this way. It is a good plan to make each child keep knitting of some sort in her lap-bag, ready for use at any odd time she may have nothing else to do.

In a short article on this subject some important points must be omitted and others simply touched, but those which are of most importance have been gone into as fully as space permitted. A list of books is added from which further information may be got :

FANNY HEATH : *Pattern-making by Paper-folding* (Longmans, Green & Co., 2*s.*).
JANE A. FLEMING : *Common-sense Needlework* (E. J. Arnold & Son, Ltd., 3*s.* 6*d.*).
T. M. JAMES : *Needlework, Knitting, and Cutting-out* (Longmans, Green & Co., 6*s.*).
AGNES WALKER : *Needlework and Cutting-out* (Blackie & Son, Ltd., 5*s.*).
AGNES WALKER : *How to make up Garments* (Blackie & Son, Ltd., 4*s.*).
Circular 730 (1*d.*).
Circular 719 (1*d.*).

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SCHOOL GARDENS

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The Soil

In a garden we are concerned for the most part with plants that are rooted in the soil and require their food material brought to them. The chief factors in the environment are the soil and its contents, including bacteria, water, air, light, temperature. There is further the competition that the crop plants suffer from weed plants, and the attacks made on the crop plants by fungi and insects.

The bulk of most soils consists of mineral matter that has resulted from the decomposition of rocks, and organic matter or humus from the decay of vegetable and animal tissue.

The chemical and physical nature of the soil are each of great importance. Certain elements must be present in the soil to supply necessary food material, while the texture of the soil must be such that it can retain moisture and admit air, and allow for the spread of a branching root system.

Roughly, soils can be classified according to their content of clay, or sand, or lime, or humus. A clay soil—the clay is not pure clay, but such elements are represented as potassium, calcium, magnesium, iron—by itself is unfavourable to the cultivator as being too cold, too damp, and too firm for the spread of the roots of the plant or for proper aeration. Sand by itself would, as far as its chemical content is concerned, be practically a barren soil for the plant, while physically it is too open and too dry. A mixture of clay and sand—a loam—serves to render available the useful qualities of the clay, such as retentiveness of moisture, and the holding of food material, already present in the soil or

resulting from decompositions. Loams differ according to the respective percentages of clay and sand and lime that are present.

A most useful substance in the soil is limestone (carbonate of lime), present in some soils. Where lime is deficient it ought to be added. It is useful as a plant food ; clay soils are rendered more friable and more open, more easily worked and warmer ; it neutralises organic acids that arise in the soil from the oxidation of organic matter, and so corrects acidity ; it adds to the retentive power of the soil for useful salts, *e.g.* potash and phosphates, it renders available plant food material by attacking and breaking down complex insoluble compounds ; it aids nitrification (see below). In liming, ground quicklime should be employed, or as a fine powder just after slaking.

Humus is the product of the decaying vegetable (and animal) matter in a soil. The rotted leaf-mould of the gardener is a good example. Humus has effects chemical and physical. Physically, humus in a soil makes the soil more open for aeration, and enables it to absorb and retain moisture. Chemically, the soil from the decomposition of the vegetable matter derives carbon and nitrogen-containing compounds.

The Biology of the Soil.—The surface layers of the soil are the home of bacteria and fungi, and of small animals that play an important part in rendering the soil fertile. The complex organic matter in the soil is attacked by different bacteria and decomposed into simpler principles—*e.g.* ammonia. By a special organism the ammonia, having united with carbon dioxide, is converted into nitrites, and by still another bacterium the nitrites are converted into nitrates, which are absorbed in solution by the roots of plants. The ammonium carbonate must not be in excessive amount. Plants are unable to grow without nitrogen; the free nitrogen of the air is not available; nitrogen in combination as nitrate is necessary, and, save when combined nitrogen is offered directly say as nitrate of soda, its production is the result of the activity of bacteria. The nitrifying bacteria require for their activity requisite food materials, fresh air, a suitable temperature, moisture, and the presence of a base such as carbonate of lime in the soil. The bacteria must not be exposed to light.

There is increasing evidence of the useful part played by bacteria and fungi in decomposing the collections of plant wreckage in soils.

Again, peas and beans, and clovers and leguminous plants generally are able to make use of free nitrogen, and to flourish in soils destitute of, or poor in, combined nitrogen. Leguminosæ are able to do this, not from any virtue in themselves, but from their partnership with bacteria in nodules on their roots. These bacteria make nitrates from free nitrogen. In a soil destitute of bacteria, Leguminosæ are as helpless as any of the other higher plants in absence of combined nitrogen.

Real fertility then has a threefold relation—viz. to the chemical nature of the soil, the physical properties of the soil, and the biological character of the soil.

It must not be supposed that all soil bacteria are useful to the plant. Some bacteria are harmful. There are inter-relations between the soil organisms themselves—helpful relationships and antagonistic relationships. Recent investigations reveal the problem of micro-organisms in the soil as a very complex one, and it has been found that certain Protozoa (microscopic animals) act as a check to, and feed upon, the useful soil bacteria.

The Food Materials of a Green Plant

Analysis of the ash of a plant left behind after burning, and of the gases given off, would show the elements carbon, oxygen, hydrogen, nitrogen, sulphur, phosphorus, potassium, calcium, magnesium, iron, sodium, silicon, and traces of other more or less accidental elements, according to the habitat of the plant. The first six are necessary for protoplasm, while in addition potassium, calcium, magnesium, and iron are necessary for healthful growth. In the absence of iron, chlorophyll would not be formed, and the chlorotic plant could not make its living as an independent plant. The carbon required is obtained by the green parts of the plant—the leaves especially —from the CO_2 of the air. The CO_2 is broken up and water is broken up, and sugar or starch is formed, while free oxygen is liberated. This assimilation of carbon requires the following conditions: living protoplasm; sunlight, from certain rays of which the necessary energy is obtained; chlorophyll, which traps

and harnesses the energy; a suitable temperature; and the presence of certain mineral matters, chiefly potassium compounds.

Hydrogen is obtained from the water which passes in at the roots of the plant. The leaves of the higher plants do not take in water, although water on the leaves, or on or in hairs on leaves, may give a moist environment, and so tend to reduce transpiration. All the other elements named above save carbon pass in at the roots in solution.

The problem of feeding our plants is rendered less complicated by the fact that leaving lime apart, the necessary plant food materials are present in sufficient quantity in most natural soils without requiring to be added, with the great exceptions of nitrogen, phosphorus, and potash, which three are likely to become deficient. Not only are these absolutely necessary for all our garden plants, but a chief call is made on one or other of them by different plants, as will be seen by reference to our School Garden Plot (Figs. 1 and 2), where the crops are arranged according to the demand they make on dominant manurial ingredients. All these three must be present; if one be absent, or not in its minimum proportion, no superabundance of the remaining two can make up for the lack of the third.

Nitrogen is absorbed in solution by roots as nitrates. Its effect on the plant is seen chiefly in the vegetative organs, in greenness of colour, and in luxuriance of leaf and stem. It is associated with rapid growth.

Phosphorus absorbed by the roots, in combination as phosphates, is a constituent of proteid matter, and in its absence seeds fail to develop properly. Hardiness, early ripening, and fruitfulness are associated with phosphates.

Potassium, absorbed in some form of combination in solution by the roots, is markedly associated with the distribution of the carbo-hydrates. Stores of these are favoured by potash—*e.g.* in the tubers of the potato and in fruits. Flavour and quality are associated with potash.

Improvement of Soils

1. *Manures.*—In order to supply nitrogen, phosphates, and potash the soil is manured. Some manures are termed general

manures, as they contain varying quantities of the essential materials. One or other of the three chief substances named above may be deficient, or may be wanted in excess for a special crop plant, and it is convenient to have an artificial or mineral fertiliser which can be applied by itself, without inducing a wasteful and possibly harmful excess of some other ingredient that may not be deficient.

Farm-yard manure or dung is a good example of a general manure. It consists of (1) solid excretory matter of farm animals; (2) liquid excretory matter; (3) the litter or straw. The School Garden shown in the plans (Figs. 1 and 2) was manured to begin with, with farm-yard manure at the rate of 20 tons to the acre. The advantages of such a dressing are: (1) Farm-yard manure contains proportions of the three important necessaries: nitrogen, potash, and phosphoric acid. The percentages of these vary according to the kind of animal and its age, the quality of its feeding material, the nature of the litter, etc. (It will be seen by a reference to the Plans (Figs 1. and 2) that artificial manures were subsequently added owing to the proportions of nitrogen, potash, and phosphoric acid in the dung not sufficing for all of the crops.) (2) Farmyard manure adds to the soil a large quantity of organic matter useful in various ways: thus (*a*) heavy soils are rendered lighter, more porous and friable, and easier to work; (*b*) on lighter soils the dung is applied rotted and is effective in conserving soil moisture, so that the danger of drought is lessened; (*c*) moisture and manurial matter are better absorbed and retained; (*d*) cold soils get added heat from the process of fermentation; (*e*) in fermentation CO_2 is given off, and this increases the solvent power of the water of the soil, so that an increased amount of plant food material, *e.g.* phosphates and potash, is set free and brought into solution; (*f*) the effect is lasting, benefiting the next crops in the rotation; (*g*) nitrifying bacteria are present along with the nitrogenous organic matter on which these act.

Nitrogenous fertilisers: When there is occasion to give additional nitrogen a reference to the Plan of the School Garden (Figs. 1 and 2) will show that sulphate of ammonia is recommended as the dressing. Another manure containing nitrogen is nitrate of soda.

Phosphatic fertilisers: Thomas's Phosphate can be recommended as in the School Garden Plan (Figs. 1 and 2). Another fertiliser is superphosphate. Some natural manures—*e.g.* bones, contain phosphate of lime.

Potash manures: Sulphate of potash is recommended in the School Garden Plan (Figs. 1 and 2). Kainit and muriate of potash are also salts of potash, and are in use as manures.

2. *Working the Soil.*—Numerous advantages accrue from tillage operations by spade and hoe. Digging affects the soil as regards its openness, so that the root system of the plant can develop and spread; the breaking up of the soil means a better circulation of air, a freer movement of water, and a better retention of moisture. Not only will the soil be warmer and better aerated, but there will be easier access for oxygen, carbonic acid, and moisture, so that the chances of bringing mineral matter present in the soil into solution are increased. Chemical and physical action on fresh portions of exposed soil produce a condition of soil favourable for a seed-bed and for plant growth. Cultural operations that favour the plant especially in its young and tender state are often a great aid against the attack of insects and fungi.

A most commendable mode of preparing the ground for the School Garden is to bastard-trench or double dig it. The ground is divided up into plots or sections thus:

I	II	III	IV
	X		
A	K		
B	H		
C	G		
D	F		
E	E		
F	D		
G	C		
H	B		
K	V		
Y			

Remove the soil from the rectangular area A of I one spade deep, and lay it at X. Then dig the soil of A of I to another spade depth, turning it over and stirring it so as to get it into a fine state of division. Do not remove or bring this second spade depth to the surface, but let it remain in trench A of I.

Now remove the soil from the rectangular area B of I to a spade depth, and throw it into trench A. Then dig the soil of B of I to another spade depth, turning it over, but

letting it remain. Continue this to K of I. Meanwhile a second worker may have started at A of II, and having removed the soil to a spade depth this is laid at Y. When the worker in I reaches the rectangular area K of I, having removed the soil to a spade depth and thrown it into H of I, and having worked the soil in trench K of I to another spade depth, but allowed this second spade depth to remain in position, he then fills up K of I with the soil of Y. When the second worker has reached K of II, and dug and thrown into H of II the top spade depth of K of II, he fills this trench of K of II with the soil lying at X.

In this process of double digging it will have been noticed that the second spade depth in each rectangular area has been allowed to remain at the same depth. This is done because experience has shown that the soil of the second spade depth if brought to the surface is not at all so immediately favourable for a seed bed or for plant growth—perhaps from lack of sufficient aeration or perhaps from its biological nature.

Two further points may receive attention here.

(1) The farm-yard manure can be applied during the trenching operation, a layer of it being worked into each rectangular area or trench on the top of the second stirred spade depth, previous to filling in the trench with the top spade depth.

(2) Where lime requires to be added this can be done at the breaking up of the beds at the rate of one stone of ground lime per thirty square yards, the succeeding yearly dressings being at the rate of seven lb. to thirty square yards.

In cases where a choice of site is possible for a school garden there should be an exposure to the south or between the south-east and south-west, so that advantage be taken of the sun's light and heat. Shelter or protection on the north and east sides from winds is advantageous and in many cases absolutely necessary. The soil should be a medium loam.

Water in Relation to the Plant

Water is a dominant factor in plant life. It is necessary for the life of the protoplasm; the living cells of the plant arrange for the presence of water. Water carries into the

plant, in solutions, necessary food materials; and CO_2 for sugar or starch-making, and oxygen for respiration are conveyed in water in the plant; water makes possible the tension or turgidity in living tissues, without which growth is impossible; water prevents collapse of cells, and may be a part of the mechanism in plants for necessary and useful movements, or for the conduction of stimuli.

Oxygen

Without oxygen the life of the plant would be impossible. Generally it may be stated that all plants breathe, and all plants breathe always. There is a gaseous interchange between the plant and its environment; free oxygen is taken in, organic matter in the plant is broken down, and carbonic acid is given off. This takes place in all the living parts of the plant, and provides energy necessary for the vital processes of the plant. There is a loss of substance, but a gain in energy: stop respiration, and all work in the plant is stopped. (Combined oxygen passes into the plants when salts that contain it are absorbed; this combined oxygen takes part in constructive processes.)

Respiration, resulting in a loss of substance by the plant and a fouling of the air, must not be confused with the carbon-assimilation process mentioned earlier. The carbon-assimilation process is a constructive process, adding weight to the plant, while at the same time the air is purified. Although respiration goes on day and night, and the taking in of CO_2 for carbon-assimilation only in the presence of sunlight, yet so much more CO_2 is used up in sugar-making than is given off in respiration, that the general effect of green plant life on the air is a purifying effect.

The Living Plant

The plant in nature has two great purposes in its life—viz. to provide for the preservation of its own life, and to provide for the future of its species. The first problem is solved by its vegetative organs, the second by its reproductive organs.

1. **The Vegetative Organs** are root, stem, and leaf, and they

include different systems of tissue for definite work: formative tissue, protective tissue, mechanical supporting and strengthening tissue, absorptive tissue, conducting tissue, assimilative tissue, aeration tissue, excretory system, and places for storage.

The Root System, by its branching, takes possession of the soil. Its great functions are to fix the plant and to take in water with the necessary salts or mineral matter in solution. The great absorbers of water with salts in solution are the root hairs, which are living cells, whose attachment to soil particles is an intimate one. The food material in the soil is dissolved by water or by water containing carbonic acid gas in it, aided by CO_2 and other acids excreted from the root-hairs. The conditions necessary for the absorption by the roots and for its continuity are: (*a*) the presence of a sufficiency of water; (*b*) the solution must be a weak or dilute one, less dense than the contents of the root-hairs; (*c*) the soil must have a certain degree of warmth; if it be too cold absorption is retarded or prevented; (*d*) there must not be richness in humus acids; (*e*) there must be access of oxygen.

The useful water in the soil is the film of hygroscopic water round the soil particles, and capillary water. The ordinary free water of the soil where drainage is imperfect can be harmful, because a water-logged soil is a cold soil, and so absorption is interfered with, and because the water filling the spaces between the grains of soil so interferes with the access of fresh air that the roots are suffocated. In suitable conditions, the water taken in at the root-hairs by osmosis passes inwards through the cortex of the root, and is pressed into the xylem or woody elements. By way of the xylem the crude sap passes upwards—the vascular or conducting system being continuous—and out into the leaves by the xylem of the veins. In the Leaf the carried food material is left behind, while the water evaporated into air spaces in the leaf passes out by the stomata as water vapour. This giving off of water vapour is known as transpiration. Not only is there a carrying upwards of crude sap, but, by means of the phloem or bast, sap elaborated in the leaves is conveyed downwards. The Stem not only serves for the carriage of water and food materials, but it also affords attachment, and gives exposure, to the leaves.

The foliage, exposing a broad surface to the light and air, performs the functions of assimilation, transpiration, and respiration.

2. **The Reproductive Organs.**—Flowers are collections of leaves modified for the production of seed. The essential organs are the stamens, with their pollen grains; and the carpels, which fold to give rise to an ovary for inclosing and protecting the ovules, and later the seed, a stigmatic surface for the reception of the pollen grains, and a style for the conduction of the pollen tube previous to fertilisation. A Seed contains a young plant and a store of reserve, upon which the young plant can nourish itself during germination, until it is able by its own roots and shoots to feed for itself. As we shall see presently, in addition to sexual multiplication by means of seed, many plants have also the power of vegetative multiplication, from separated parts of the plant body.

Stores and Storage Organs

As absorption by the plant is more or less a physical thing and likely to continue while the conditions for absorption remain favourable, there is the likelihood of more food material being taken in than is required for the needs of the moment. This means a storing of the excess. Such stores of reserves may be of great advantage to plants, exposed as these are to, it may be, periodic or accidental weather and environmental changes which interfere with absorption. The stores may be of carbo-hydrates, or proteid, or oil. The storage place may be any organ of the plant more or less modified for the purpose. It has already been stated that every seed contains a supply of reserve, sometimes inside the seed leaves, sometimes outside; many fruits contain stores. We meet with such special storage organs as swollen aerial stems of kohl-rabi, the rhizomes or underground stems of grasses, the tubers of the potato and artichoke, the corms of the crocus, the swollen scales of lily and onion bulbs, the swollen taproots and hypocotyl of turnip, radish, carrot, and beet, the root-tubers of the dahlia. Excellent examples of how food stores may be in different places in a plant can be had by taking crop plants in the

Natural Order Cruciferæ. In the cabbage the apical bud forms a head; the savoy is the same, but the leaves are wrinkled, the reserve being in the leafy parenchyma; in brussels-sprouts the lateral buds are swollen; in Portugal cabbage the reserve is in swollen midribs of leaves; in kohl-rabi we have a store in round swollen stem, and in Jersey cabbage in elongated stem; in turnip and swede the reserve is in tuber-like roots; in cauliflower in abortive flowers, and the same in broccoli which is just a hardy cauliflower; in rape we have a store of oil in the seed; black mustard is also grown for its seeds.

Length of Life of the Plant

The character of the organ of storage may serve to give indication of the length of life of the plant, or of the time at which the crop would be best harvested, or of how the plant might be usefully multiplied, or how and when—in the case of weeds—the weeds can be most successfully fought. Typically, in the case of herbaceous plants, if the only store of reserve present is in the seed, then the plant is likely to have the life of one season or one year, producing in this time its vegetative organs, flowering, fruiting, seeding, and dying. Such a plant is commonly known as an Annual. If the reserve be in a swollen tuberous root and hypocotyl, *e.g.* turnip and carrot, then such a plant will also only flower and seed once, but flowering will not take place till the second year. The first year is devoted to vegetating and storing, and at the expense of this reserve flowering and seeding take place in the second year, and death follows. Such a plant is spoken of as a Biennial plant. The gardener, however, by cultural methods may make a so-called Annual live over the winter into the next year, and Nature herself, because of unfavourable weather, or soil, or seed conditions, may cause a Biennial to "bolt," and behave as if it were an Annual. A Perennial plant is often defined as one that lives for a number of years and flowers repeatedly, but there are plants —not plants of our school gardens, however—which live for a number of years and only flower once.

The Multiplication of Plants

1. **By Seeds.**—A ripe seed consists of an embryo plant, a store of reserve and a protecting coat or coats. In germination the young plant makes use of the reserve laid up for it by the parent, and it will probably have begun to feed for itself before all the reserve has been exhausted. The conditions for germination are a supply of moisture, oxygen, and a favourable temperature. From what has preceded the importance of a good seed bed, *i.e.* the bed in a state of fine tilth, will be understood. In the presence of favouring conditions the seed swells, the reserve of food material—starch, or proteid, or oil—is made soluble and diffusible by the agency of ferments, and the young plant grows. Seed should have not only a high germinative capacity, but the vitality or energy of germination is important, so that the young plant may not linger in the tender stage which renders it susceptible to insect and fungus attack.

In sowing seeds these must not be put in too deeply. Very fine seeds—*e.g.*, lobelia—should only be pressed in or just covered; heavier plants that need a better anchorage may have their seed sown deeper. Beans and peas, for example, may be put in, peas at 2 to 3 inches and beans at 4 inches deep. Sow thinly and let the drill be flat. Thin early where thinning has to be done. (Where seed is sown in pots the pots should be plunged in some substance that holds air and moisture, as the roots make their way to the sides of the pot and must not get dry.) Seeds, like peas or others, are protected against mice and birds if they are wetted and dusted with red lead before sowing.

2. **Cuttings.**—A cutting is a portion of a plant severed from the parent which on being placed in the soil is capable of giving rise to a new individual. The cut surface placed in the soil typically forms a healing tissue or callus and adventitious roots. There are woody cuttings or hard-wooded cuttings, and herbaceous or soft-wooded cuttings. Woody cuttings can as a rule be treated with greater freedom; the cut-away part or cutting contains reserve on which the cutting can depend while and till the adventitious roots are produced. Examples are elder, laurel, privet, broom, gooseberry, currants, roses. In late autumn

typically (the end of October and in November) break away a side shoot that brings away with it a small piece of the last year's wood. If leaves be present cut away the lower ones. The cutting should be 10 to 12 inches long, the lower part with the heel of wood is always to be left. Insert in the soil, which has been previously worked, and firm the soil round the inserted cutting.

Leafy, herbaceous cuttings have no reserve to fall back on, and great care must be taken that the outgo of water is not greater than the intake, therefore till roots have formed the cuttings must be protected against over-transpiration. Earlier than with the last kind of cuttings—say August—cut away a 2 to 3 inch shoot and remove the lower leaves. Make a straight, clean cut below a bud or buds, and place the cut end, to a depth of one or two inches, in the hole made in the soil, making sure that soil and end of cutting are in intimate contact. These cuttings are generally placed in special soil, and receive protection in a frame or greenhouse. If the cuttings be put in a pot it should be round the edge. Then water and keep in the shade for a time. With potted plants care should be taken that they are not allowed to dry so that the soil shrinks away from the side of the pot. Aeration is very important, and this will be secured by the arrangement of crocks at the bottom of the flower-pot. A compost for such cuttings is made of 2 parts loam, 1 or 2 parts of leaf-mould (pick out any little sticks) and 1 part sand. By this compost we shall have a soil sufficiently open, sufficiently retentive of moisture, and containing food material. As regards herbaceous plants there is little limit to their propagation by cuttings. Examples are geranium (which is not quite so sensitive to light after potting), pinks, lobelias, fuchsias, snapdragons, dahlias. Some plants can be multiplied from root-cuttings and some from leaves.

3. **Layering.**—The branch to be layered—a strong side one—is bent down to the soil of the box or to the ground, and kept fixed by means of a peg. Roots will be given off, and then the connection between the bent branch and the parent stem can be cut through. The formation of the adventitious roots is stimulated by bending the layered branch and cutting a little notch

in it; *i.e.* the bent branch is first cut to near its middle from the under surface, and then slightly along. (In Nature we meet with branches which have bent down and reached the soil, layering naturally.) The carnation is a favourite plant for layering, the time being from the end of July to mid-August. Rhododendrons and azaleas can also be layered, but for plants of this family the compost prepared should have the leaf-mould replaced by peat.

4. **Division.**—Plants that have many roots and stems, plants with tubers and rhizomes and bulbs can be multiplied by the whole plant being taken up and divided up into a number of pieces. A bud should be left on each piece. Where bulbs, *e.g.* the scaly bulbs of the lily, are so treated, the fleshy scales are removed and inserted well down into the compost. Herbaceous perennials can typically be multiplied by division, very early flowerers being divided in autumn, while with others the division can be postponed to spring. Plants which get overgrown and straggling after a year or two's growth can well be divided.

Plants may also be multiplied from *Corms* and *Bulbs*. A Corm is a swollen stem, with the cells full of reserve; on the outside are a few thin leaves, but the great bulk of the corm is stem with a bud (or buds) at the apex. The crocus and gladiolus are examples.

A Bulb has the reserve in fleshy leaves that are entire, and overlap without being closely packed round one another (a scaly bulb—*e.g.* Lily), or the reserve is in leaf bases, and these are wrapped round one another (a tunicated bulb—*e.g.* onion and hyacinth, snowdrop and narcissus). The stem is a comparatively small portion in a bulb. In planting, place corms and bulbs in the soil at a depth of three times their diameter.

5. **Runners.**—A runner is a branch given off from the base of the stem; it creeps along the surface of the soil and roots at the nodes, and so anchors itself. The buds on the runner send shoots into the air, and separated from the parent stem give new plants. The strawberry is an excellent example of a plant that can be propagated from runners. The first plant of a runner —the one nearest the parent stem—is, in June, placed in a pot; the part of the runner beyond this plant is cut away.

Or instead of using pots a turf can be placed below the first plant, and the roots pass into the turf. The connection with the parent is severed at the end of August, and the young plants lifted and planted without the roots suffering. In putting in the young plants a space of 2 to 2½ feet should be left between plant and plant, and a distance of 2 feet between the rows. Care should always be taken to choose the runners from plants which are known as fruit-bearers. Planting is at the end of August, and all planting should be finished by September.

6. **Budding.**—This is the taking of a bud with a portion of bark from one tree or shrub, and so placing it on another tree or shrub that there will be union between the two, and the bud will grow out into a branch as if it had been itself a bud of the stock. In the process a bud is carefully removed from a plant, along with a small portion of the leaf-stalk and about ¾-inch of bark; a T-shaped incision is made in the bark of another plant, known as the stock, the cut going as deep as the cambium. The bud is then inserted into the top of the T-shaped incision and pushed down and fitted into the incision. Union takes place by the activity of the cambium of the stock and that of the bud. After fitting in the bud tie bast or some wrapping round so as to close the bark above and below the bud, and exclude air that might cause a drying. In time the wrapping or tie will require to be slit so as to prevent it growing into the callus. Cut the tie through on the side opposite the bud. Examples of plants that can be budded in the open are roses, cherry, peach and plum, apricot, nectarine, apple, pear.

The rose may be taken as an example. There are two favourite stocks: the briar, which will be advantageous where the budded forms are tender—tea roses do well on it—and the Manetti stock, for strong-growing kinds.

Young plants, or cuttings of young plants, are taken in November; the lower buds, from a stock about 16 inches long, are cut away and the stock placed in the bed. The further proceedings vary according as we desire roses of the bush type or standards or half-standards. The stock in the case of the bush type is cut back and the bud inserted low down, at the surface of the ground, as near the roots as possible. The bud should be

chosen from about the middle of a half-a-foot-long shoot of the year. Budding can be done from near the middle of July to the end of August. In the case of standards we grow till the stock is three or four feet high. Then cut back the stock to where it is purposed to bud it. From the two top buds left at the top of the cut-back stock shoots will come, and into these—at their base—introduce the buds; the young side shoots into which the buds are inserted are shoots of the same year as the buds.

Stocks may be raised from seed. Roses can also be propagated from cuttings.

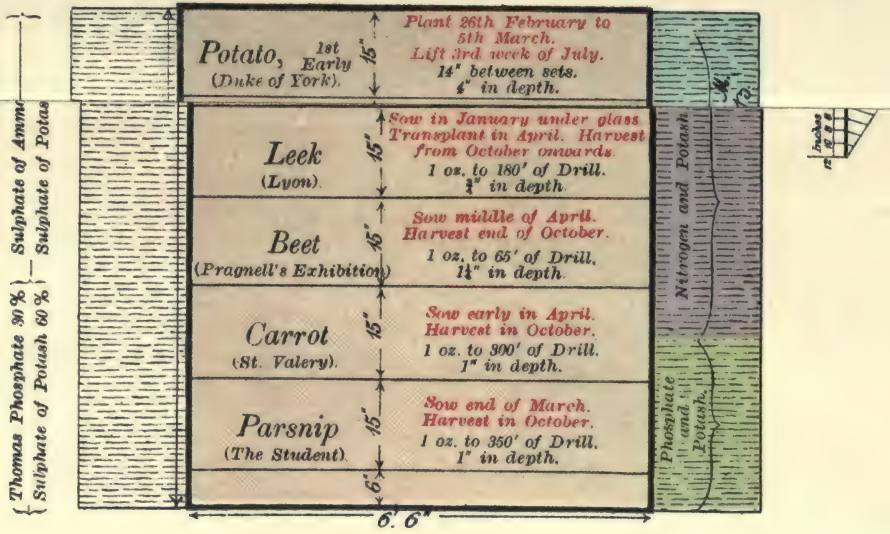
7. **Grafting.**—A cutting known as the scion—with several buds on it—is removed from the parent plant and made to grow on the stem of another plant known as the stock. The cambium of the scion and the cambium of the stock are brought into contact. The two are fitted together, and bast or grafting wax or clay applied to keep in moisture.

From mid-March to mid-April is a favourable time for grafting in the open. The scion should have three or four buds on it, the lowest of which should be near the cut surface applied to the stock; the stock should be cut back close to a bud. The scions are cut in January and February, while still dormant, from strong clean shoots of the previous year; they are placed till required in March or April in the soil on the north side of a wall out of the sun, so that they may not dry and may keep dormant.

There are various kinds of grafting—*e.g.* whip or tongue grafting, wedge grafting, crown grafting, inarching. In whip or tongue grafting, which is a common kind of grafting—the stock and scion being about the same thickness—the stock is cut back and then a sloping cut is made two inches or so long; a wedge-shaped portion or notch is then cut out from the upper part; the scion is cut so that it will fit the stock, and the two are tongued into one another. In crown grafting the stock is thicker than the scions which are grafted on it.

Apple, pear, cherry, plum, are examples of plants propagated by grafting. Just as with the rose so also with these four plants we have two kinds of stock. In the case of the apple one of them is the crab—half-standards on crab stocks—a stock which

With some of the following crops there is considerable variation in treatment. Thus Cabbage, Cauliflower, Brussels Sprouts, Savoy, and also Onion, may be sown about the 10th of August, wintered in the open, transplanted at the end of February, and harvested from June onwards. Again, Lettuce may also be sown at the end of August, wintered in the open, and harvested from March onwards



is used where the trees are to have a long life, fruiting not early but for a long period of years. The other is the Paradise stock, which affects the apple budded or grafted on it in a way like the influence of the Manetti stock on the rose—namely, to produce a dwarfing, and a shortening of life; there may be twenty-five fruiting years only, but the trees fruit far earlier, more can be planted to the acre, and cultural operations are not so troublesome.

In the pear we have the wild pear as a stock and the quince as a dwarfing stock. In the plum for orchard trees we have the Mussel plum for a stock, and for bush or pyramid plants the Myrobalan stock. In the cherry the Gean is the stock for tall trees, and for a dwarfing stock there is the Mahaleb.

The School Garden and its Crops

The size of the garden and the number of separate plots will depend on the space that can be had, and on the number of pupils. Fig. 1 is a Plan of a school-garden laid down by Mr. G. P. Berry in connection with a class at Corstorphine, near Edinburgh, under the auspices of the Edinburgh and East of Scotland College of Agriculture. There were a number of separate plots, each a repetition of Plan 1, and each was worked by two students. The times of sowing, the varieties used, the manures applied, were such as were fitted for the district, and were chosen as a result of Mr. Berry's wide experience and skill in horticulture. The soil had been previously dunged. The colours in the Plan represent dominant manures, nitrogen being represented by red, potash by blue, and phosphates by yellow. A mixture of any two of these primary colours is represented by the result —*e.g.* the orange colour alongside a number of the crop plants means that such received an extra manuring with nitrogen and phosphate (red + yellow = orange), and so on. Plan 1 shows that crops are grown together that make the same call on special food materials. An attempt is made in Figure or Plan 2 to indicate Rotation of Crops, the crops on that Plan being taken in the second year, during a second student's course in the same garden. The general instructions given as to planting and amount of seed and depth of sowing are given in detail on Fig. 1.

The various text-books (see appended list of literature) give

manures and their proportions for the different crops, special fertilisers being applied according to the special requirement and demand of the individual crop plant. Berry's recommendations are :

Potato.—Sulphate and muriate of potash (55 per cent. to 60 per cent.), one open handful to 5 yards of drill (or better, 1 lb. to 30 square yards) in autumn. Burnt clay and wood ashes are also useful.

Cabbage Family.—Basic slag (28 to 30 per cent. of phosphates) and sulphate of ammonia in proportions of 2 of slag to one of ammonia ; but these must not be mixed. Sow sulphate of ammonia between the drills when growth starts, 1 open handful to 5 yards. Apply slag early in spring or late autumn, 2 handfuls to 4 yards between the drills. In very light sandy soils steamed bone flour may be substituted for the slag applied in the same proportions and at the same season. In medium soils the slag and steamed bone flour may be used, half the quantities of each being used and sown separately.

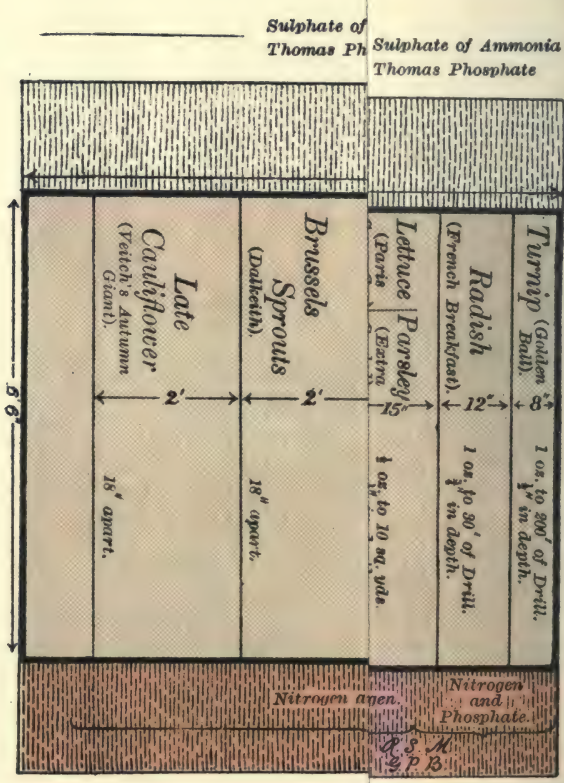
Pea Family.—Sulphate of potash and basic slag in the proportion of 2 of the potash to 1 of the slag, 1 open handful to 4 yards where there is a drill of peas. Also wood ashes and burnt clay.

Onion, Leek, Celery.—Sulphate of ammonia and sulphate of potash in equal proportions, 1 closed handful to 2 square yards, or 9 feet of a trench, when growth commences. Repeat every three weeks.

Beet, Carrot, Parsnip.—Basic slag and sulphate of potash in equal proportions, 3 lbs. to 30 square yards before sowing.

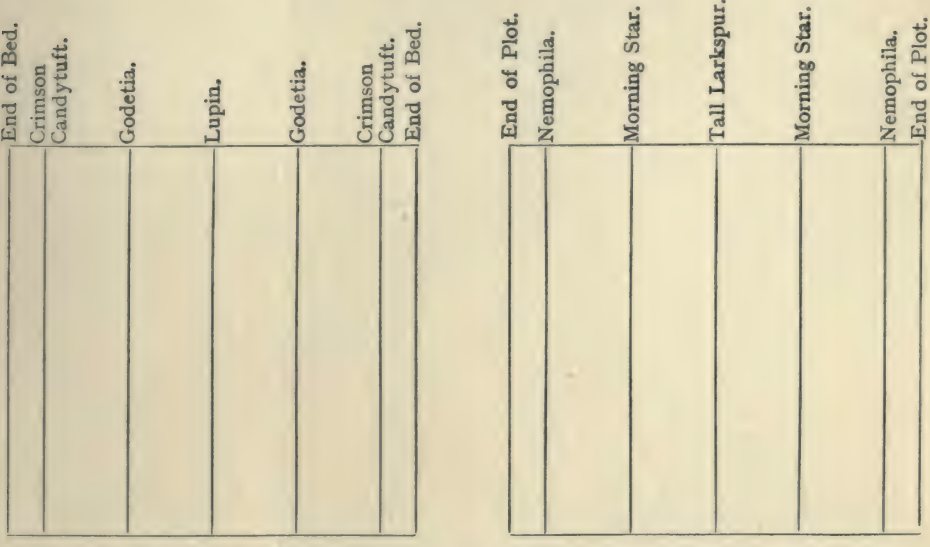
Lettuce, Spinach, Radish.—Sulphate of ammonia, ½ lb. in 30 gallons of water, or ½ oz. to a square yard every three weeks. One peck of poultry manure in 30 gallons of water makes a useful liquid manure ; or 1 peck of sheep manure in the same quantity of water. Add to each of the foregoing 5 lbs. of soot which has not been on fire.

Rotation of Crops.—Fig. 2 shows the succession of crops grown in the year succeeding what is shown in Plan 1. There are physiological and economic justifications for crop rotation, and the principles underlying such rotation receive explanation


Sulphate of
Thomas Ph
Sulphate of Ammonia
Thomas Phosphate
Turnip (Golden Ball).
8"
1 oz. to 200' of Drill.
½" in depth.
Radish (French Breakfast).
12"
1 oz. to 30' of Drill.
½" in depth.
Lettuce
Parsley (Extra
15"
¼ oz. to 10 sq. yds.
Brussels Sprouts (Dalkeith).
2'
18" apart.
Late Cauliflower (Veitch's Autumn Giant).
2'
18" apart.
6' 6"
Nitrogen agen.
Nitrogen and Phosphate.
K
P
B

in connection with Fig. 2 as compared with Fig. 1 and are also the basis for the Rotation of Agricultural Crops seen in the Plan of the Kettins School Garden (Fig. 4, p. 197).

Flowers.—In the same year in which the plots were treated as in Plan 1 we had two complete plots over (26 ft. by 6½ ft.). They were sown for flowers, 15 in. between the rows, thus :—



It should be kept in mind that at the time of flowering there will be a difference in height between species and species, and care must be taken that the arrangement is a satisfactory one, so as, for example, not to have the tallest plants all together at the front of the bed. There may be differences, too, in the times of coming into flower, and this must be thought of if the intention be to have a display of flowers at the same time: *e.g.* if the lines were laid out, from outside to centre, as follows—Nemophila maculata, crimson candytuft, dwarf larkspur, Godetia—the Godetia would be sown first, in the last days of March or so; in about a week the dwarf larkspur would be put in, candytuft three weeks later, and last of all, in about another fortnight, the Nemophila.

In a school garden laid out later than Fig. 1 and Fig. 2 there was accommodation for each plot having a length of 30 ft., and the parsnip of Fig. 1 was succeeded by three beds, one

1 ft. 6 in. broad, one 1 ft. 4 in. broad, and the last bed 1 ft. broad. In the first Godetia seeds were sown, in the second larkspur, and in the last Linum rubrum. In sowing Godetia the amount is ¼ oz. to 100 ft. of drill, and the seeds are put in ¼ in. deep; larkspur seeds ¼ oz. to 100 ft. of drill and ¾ in. deep; Linum rubrum ¼ oz. to 30 ft. of drill and ½ in. deep. It was recommended for flower crops that liquid manure should be applied after the bloom has set, and twice weekly up to the time of full expansion, 4 gallons to the square yard of a solution of ½ lb. of sulphate of ammonia, and ½ lb. of sulphate of potash in 30 gallons of water. Ferrous sulphate has an influence on the colours of flowers (and fruit), hence the recommendation to apply ¾ lb. per 30 square yards every five years. Lime and soot sprinkled round the young growths afford some protection against such enemies as slugs.

Plants grown for their flowers (the soil is prepared just as for the other garden plants) are often distinguished as Annuals—Hardy and Half-Hardy—Biennials, and Herbaceous Perennials.

A *Hardy Annual* is one that can be grown from seed and throughout its life in the open in the garden. The seeds are sown in March and April (they can be sown further in May and June if it be desired to keep up a succession). Examples of such plants chosen from long lists are: larkspur, Nigella, Sweet Alyssum, candytuft, Gypsophila, scarlet and blue flax, mignonette, tall Nasturtium, sweet pea, lupin, Godetia, sunflower, marigold (Calendula), morning glory, Nemophila insignis and maculata, Phlox drummondi.

A *Half-Hardy Annual* needs some protection (in a greenhouse or frame) in its early stages. The seeds of such may be sown, in March, in pans or shallow boxes in a greenhouse with a temperature of 60° to 65° F. The young plants are pricked out, when they can be handled, in shallow boxes, and by the end of May or in June they are hardened and placed outside in the garden. Examples are marguerites, carnations, Indian pink, Tagetes, Statice, Schizanthus, Nicotiana.

Biennials flower in their second year, and a sowing will take place every year if continuity of flowering is desired. The seed is sown from mid-April to mid-May. Examples are wallflower,

PRACTICAL SCHOOL GARDENING
Boys

PRACTICAL SCHOOL GARDENING
Girls

honesty, Sweet William, cornflower, canterbury bell, evening primrose, Gilia, foxglove. In the cultivation of Biennials, the seed may be sown in spring in a temperature of from 50 to 55° F. When the young plants are fit for handling they are pricked out in boxes or pans, and kept in a temperature of 50 to 55° F. till they are started in their new position. The plants are next hardened off by their being put out in a cold frame and then later are planted in the positions they will permanently occupy.

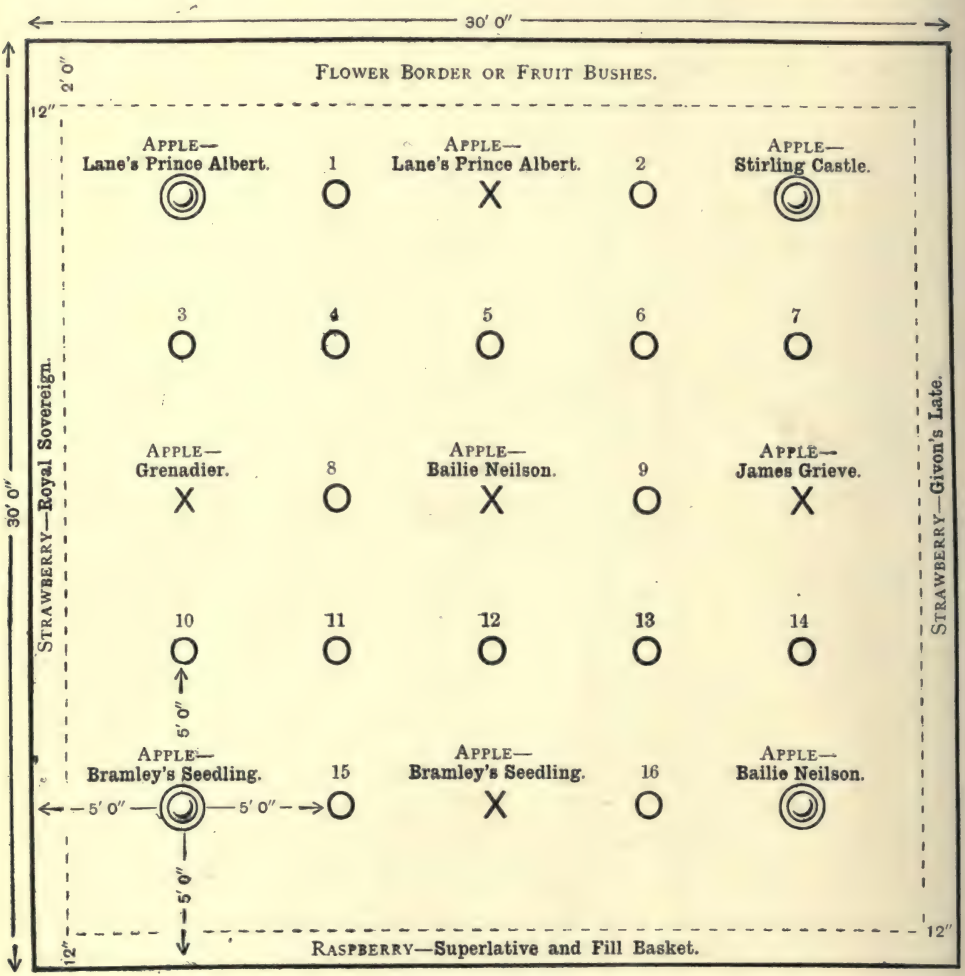
Herbaceous Perennials.—These are non-woody plants which grow in the open, and which perennate by means of a rhizome or some other organ of storage. Some are cut down by frost, so that they exist during the winter only in their below-ground parts; others retain during the winter not only their underground parts but also aerial stem and leaf, like Arabis, Aubrietia, pansies, houseleek, Saxifrages, Armeria, daisies.

Fruit Plot.—Figure 3 is a plan of a fruit plot drawn out by Mr. Berry on a most useful scale. The amount of ground should not be less per plot than what is represented on the plan. At each corner there is a half-standard apple, bush apple trees on Crab stock—*i.e.* they are 20 ft. apart. Then at distances 10 ft. apart are bush-apple trees on Paradise stock. In between these, at 5 ft. apart, and to take up the ground, are various fruit bushes. In cultivation these fruit bushes will be the first to go; after 20 to 25 years the bush-apples on the Paradise stocks will be over, and by that time the bush-apples on the Crab stocks will be bearing, and will occupy the whole space and continue to bear for many years.

A reference to the Model Plan of the Kettins School Garden will show the fruit plot on a larger area, but a happy feature of the plan is that the fruit plot, although larger, just continues the other but in duplicate—*i.e.* the Crab stocks are always 20 ft. apart, the Paradise stocks 10 ft. apart, and the fruit bushes 5 ft. apart.

Gooseberries and Currants.—These can be propagated from cuttings (woody cuttings). Propagation from cuttings has already been referred to. Here it may just be said that with Red Currants, White Currants and Gooseberries there should be careful removal of the buds on the part of the cutting that will

DETAILED PLAN OF FRUIT PLOT IN SCHOOL GARDEN.



GOOSEBERRIES.

1 and 2. Whinham's Industry (red), 5 ft. apart.
3 and 4. Warrington (red), 5 ft. apart.
5, 6, and 7. Keepsake (green), 5 ft. apart.
8 and 9. Golden Lion (yellow), 5 ft. apart.

RED CURRANTS.

10 and 11. Craigmillar, 5 ft. apart.

BLACK CURRANTS.

12, 13, and 14. Victoria, 5 ft. apart.
15. Boskoop Giant, 5 ft. apart.
16. Goliath, 5 ft. apart.

◎ = Bush Apple Trees, on Crab stock, 20 ft. apart.

X = Bush Apple Trees, on Paradise stock, 10 ft. apart.

FIG. 3.

be placed in the soil, to prevent the production of suckers; others higher up than the soil may also be removed, especially in the case of Gooseberry. With Black Currant cuttings it is not necessary to remove the lower buds, as the shoots from these buds are fruit-bearing shoots. The cuttings are put in the soil about the end of October, and in November of the next year the young bushes are taken up, pruned, and replanted with more room (12 to 18 inches) given them. When two years old they are placed in the position they will permanently occupy.

As regards the pruning in winter of Currants there is a great difference. The Red and White Currants produce their fruit chiefly on the old wood (2 to 3 or 4 years old), therefore the young white shoots—the new wood—are cut back, leaving about 6 buds. In Black Currant the fruit is produced on the new or young wood, therefore the old wood is cut out where possible, and the young shoots left, these being allowed to remain at their full length.

Black Currant and the Red Currant twigs can be thus distinguished. Black Currant twigs have a characteristic odour; buds plump and roundish; on the stalk of the bud and on the bud scales there are tiny yellow shining glands (use a lens). The one-year-old twigs are smooth and have a shining grey appearance, but on older twigs where the bark is broken the colour is light brown or greyish-brown. Lenticels can only be distinguished on the older twigs. The Red Currant buds are violet brown in colour, with a slight whitish powdering of woolly hairs, and are enclosed in closely applied scales; they are thinner and more pointed than the buds of Black Currant. The twigs are light grey or greyish brown. The outer bark cracks and remains hanging loosely in tatters.

Gooseberry in its pruning somewhat resembles Red Currant; the shoots are pruned back to spurs, and a quarter cut away from the tips of the leading branches.

Mr. George P. Berry recommends as treatment for fruit the application while the fruit is ripening of liquid manure composed of ½ lb. of sulphate of ammonia and ½ lb. of sulphate of potash in 30 gallons of water, to be put on at the rate of 4 gallons to the acre, and the top-dressing in autumn with 1½ cwt. sulphate of potash and 4 cwt. of basic slag per acre.

Destruction of Buds by Birds.—The fruit buds of the red currant, white currant and gooseberry and also plums are often destroyed by birds in the winter time. The buds should be dusted with quicklime while the plants are wet. Mr. W. E. Bear recommends the spraying of these, and other fruit plants whose buds are attacked, with a composition of 60 lbs. quicklime, 30 lbs. flowers of sulphur, 12 lbs. caustic soda, 10 lbs. soft soap, 100 gallons water. Mix the sulphur into a paste and gradually thin it and pour it over the lime (the best quality and freshly burnt). Stir thoroughly till the lime is slaked, only adding enough water to allow of stirring. Then add the caustic soda, and stir it in till the renewed boiling action which it sets up (protect the face and hands) is finished. Dissolve the soft soap by boiling it in 2 to 3 gallons of water, and stir it well into the other ingredients, bringing the whole up to 100 gallons with water. Spray in January and February.

Agricultural Plots.—In a model scheme such as that of Kettins School Garden (Fig. 4), where space can be had, there may be a series of Agricultural plots. The size of these plots is marked on the Plan. Such plots might in various parts of the country represent the rotation characteristic of the district. Mr. W. S. Bruce, B.Sc., of the East of Scotland College of Agriculture, laid out the five plots shown in the scheme to represent a five years' rotation. The first plot held Potatoes, divided into three sections: Potatoes Early, Potatoes 2nd Early, Late Potatoes; the second plot held Turnips Early, Yellow Turnips, and Swedes; the third plot was planted with three varieties of Barley; the fourth plot had Grass and Clover; the fifth plot was sown with three varieties of Oats. In the second year the crops of 2, 3, 4 and 5 moved up a place, while the crop of 1 went to 5; thus in the second year the plots read from left to right: Turnips, Barley, Grass and Clover, Oats, Potatoes, and so on. If room had allowed a six years' rotation would have been illustrated—viz. (from left to right) Potatoes, Wheat, Turnips, Barley, Grass and Clover, Oats.

Insect and Fungus Enemies

An Insect is an invertebrate animal whose body is divided into three regions: head, thorax, abdomen. One pair of antennæ

is present, and the adult has six legs. Breathing is by tracheæ. As regards mouth parts, insects are divided into the mandibulate insects, which can take solid food by biting jaws, and the haustellate insects, which take liquid food. Insects which take solid food material can be destroyed by poisoning this material; sucking insects are best fought by contact insecticides. Related to means of destroying insects is the mode of their respiration. Air is not taken in by the mouth, but through openings in various parts of the body. These openings are known as spiracles or stigmata. The spiracles lead into tubes or tracheæ, and the system of tubes and tubules branch all over the insect's body and conduct air. Certain insecticides have for their purpose the choking up of these spiracles, so as to suffocate the insect. Insects are male or female. In their life-history there is a metamorphosis, a series of changes abrupt or gradual, by which the insect passes from the egg to the adult condition. A butterfly, for example, has four stages in its life-history: known as the imago or adult stage, the egg stage, the larval or caterpillar stage, the pupal or resting stage. Insects which have these four stages marked are said to have a complete metamorphosis or to be holometabolic. Some insects, on the other hand, have an incomplete metamorphosis, *e.g.* a greenfly may lay eggs from which come larval forms that resemble in outline the parent and nourish themselves on the same food material; and after a series of moults they pass into the adult condition without any resting stage. Such insects are known as hemimetabolic.

Classification of Insects

Coleoptera or Sheath-winged insects.—The Beetles: Wings, 4; the front pair used not in flight but as wing-covers; the hind wings membranous and used for flight.

Hymenoptera or Membrane-winged insects.—The bees, wasps, ants, sawflies, etc: Wings 4, all used in flight; the front pair of wings larger than the hind pair; the hind edges of the fore-wings have a ridge or fold which, when the wings are stretched in flight, catches into a row of recurved hooks on the front edge of the hind wings.

Lepidoptera or Scale-winged insects.—The Butterflies and

Moths: Wings 4, all of service in flight and covered with scales. The Order is divided into the

Butterflies	and	Moths
Antennæ knobbed;		Antennæ not knobbed;
The wings, when at rest, are held back to back;		The wings, when not in use, are held sloping away from the body;
Fore and hind wings not linked together by a bristle;		Fore and hind wings often linked by a bristle;
Diurnal.		Fly in the twilight and at night.

Diptera or Two-winged insects.—The Flies: Wings 2; the hind wings are reduced to processes known as balancers.

Neuroptera (in its widest sense).—The Nerve-winged insects, *e.g.* dragon flies, May flies, caddis flies.

Hemiptera or greenflies, apple suckers, scale-insects and froth or spittle insects, and bugs: Wings 4, all alike and membranous (the Homoptera), or the front pair of wings horny except at the tip (Heteroptera).

Orthoptera or Straight-winged insects: Wings 4, the front pair leathery and protective and known as tegmina; the hind pair, when the insects are at rest, are folded like a fan. The insects in this Order are divided as follows:—

A. Runners:
   (1) Earwigs: with short front wings; the feet with 3 joints; forceps at end of body;
   (2) Cockroaches: with 5 joints to the feet and projecting styles at end of body.

B. Leapers:
   (1) Long-horned Grasshoppers: antennæ long, egg-laying tube of female long; feet with 4 joints;
   (2) Locusts and Short-horned Grasshoppers: antennæ and egg-laying tube short; feet 3-jointed;
   (3) Crickets: antennæ long; egg-laying tube long; feet with never more than 3 joints.

Thysanoptera or Fringe-winged insects.—Thrips: the wings are 4 and are narrow and have fringes.

Thysanura or Bristle Tails and Collembola or Spring Tails: Primitive wingless insects with no metamorphosis.

Order	Metamorphosis	Mouth Parts
Coleoptera	Holometabolic	Mandibulate.
Hymenoptera	Holometabolic	Bite and may also suck.
Lepidoptera	Holometabolic	Haustellate.
Diptera	Holometabolic	Haustellate.
Neuroptera	Complete or incomplete	Most bite, some suck.
Hemiptera	Incomplete or none	Pierce and suck.
Orthoptera	Incomplete	Mandibulate.
Thysanoptera	Slight or none	Gnaw and pierce and suck.
Thysanura	None	Fitted for biting, but withdrawn into the head.
Collembola	None	Fitted for biting, but withdrawn into the head.

Larvæ

Coleoptera: The lavra is (1) a grub with 6 legs and processes at tail end; able to move actively; has biting jaws, *e.g.* ground beetle.

(2) A grub with 6 legs and biting jaws; body curled; living in the soil, *e.g.* cockchafer.

(3) A legless grub with a curled wrinkled body; jaws biting, *e.g.* weevils.

(4) An elongated grub with 6 legs and a process at tail end used in locomotion, *e.g.* wireworm.

(5) A grub with (it may be) 6 short legs; jaws biting; living in wood, *e.g.* long-horned beetle.

(6) A grub with 6 legs and biting jaws; active, *e.g.* ladybird.

Hymenoptera: (1) a caterpillar with more legs than 16, viz. sawfly larvae.

(2) A legless grub, *e.g.* bee, wasp, ant.

(3) A grub living in the wood of trees, with 6 short legs, and a spine at end of body, *e.g.* wood wasp.

Lepidoptera: (1) A caterpillar with 16 legs, *e.g.* surface caterpillars.

(2) A semi-looper caterpillar with 12 legs, *e.g.* silver Y-moth.

(3) A looper caterpillar with 10 legs, *e.g.* magpie moth.

Diptera: (1) A legless maggot with pointed head end and mouth hooks, *e.g.* bluebottle.

(2) A maggot with a tough skin, mouth with toothed mandibles; head withdrawn into thorax, *e.g.* daddy long-legs.

(3) Small maggot with body narrowed at both ends, and an "anchor" process below the head, *e.g.* gall-midges.

Insecticides

In connection with fruit trees there are, broadly speaking, three periods for spraying plants in the open. (1) In winter when the plants are dormant. The purpose of such winter-washing is to clean the bark of trees from lichenous, mossy, and other growths, under cover of which insects in various stages of development may be hibernating. For winter-washing Pickering's formula is an excellent one, viz. :

Sulphate of iron	½ lb.
Lime	¼ lb.
Caustic soda	2 lbs.
Paraffin (solar distillate)	5 pints
Water to make	10 gallons

The sulphate of iron is dissolved in about nine gallons of water. The lime is slaked in a little water and then a little more water is added to form a milk. This is next run into the iron-sulphate solution, and the paraffin churned into the mixture. The caustic soda—bought in the powdered condition—is added to the whole just before the wash is used. This is a caustic wash, and must only be used when the plants are dormant ; and the faces and hands of the sprayers should be protected.

(2) A spraying in late spring—say April—directed against aphides or young caterpillars, etc. that may have issued from eggs not reached by the winter wash.

(3) Spraying in summer against such caterpillars or aphides as may be present.

Against jawed insects the spray should be of arsenate of lead bought in the paste form ; or if made by the sprayer, then Pickering's formula should be followed, viz. :

Arsenate of soda (pure or crystalline)	3½ ounces
Acetate of lead	7 oz.
Water	10 gallons

In making, dissolve the arsenate of soda and the acetate of lead separately in water and then mix. This spray will serve against such insects as eat solid food material. The poison remains attached to leaves, etc., and the insect that eats is killed. As

arsenate of lead is poisonous it should not be used on any part of a plant that later would be eaten, *e.g.* not within six weeks of the plant being harvested.

For sprays against sucking insects like aphides, tobacco or dilute paraffin emulsion or soft soap and quassia are excellent, but care should be taken that the insects are actually in this case touched by the sprayed material.

Against grubs in the soil vaporite may be used, or the soil may be fumigated with disulphide of carbon. This substance —near which no light should be brought—volatilises in the soil, and the poisonous vapour kills insects within reach. The plant itself should not be touched by the liquid disulphide of carbon. This fumigation is too expensive on a large scale.

With some plants, *e.g.* celery and chrysanthemum, the leaves are mined by maggots, which cannot be reached by any spray from the outside. Infested leaves should be pulled early and burned, or the plants should, as a preventive measure, be sprayed with dilute paraffin emulsion to prevent egg-laying. Against carrot fly a soap and paraffin emulsion is useful, the bed being sprayed after sowing, then again after germination, and a third time after thinning.

The Class Arachinda contains the Mites, some of which are destructive to plants, *e.g.* the Mite which causes Big Bud in Currants, the Pear Leaf Blister Mite, and Red Spiders (see Board of Agriculture Leaflets, Nos. 1, 239, and 41).

Fungi

Fungi are plants which cannot be differentiated into root, stem, and leaf; their vegetative parts consist of delicate branched threads—sometimes septate, sometimes non-septate—known as the mycelium. A great feature of Fungi is the absence of Chlorophyll, the green colouring material of plants the possession of which enables the plant to lead an independent existence. Fungi in absence of Chlorophyll are not able to build up their body from simple absorbed substances, but require their food material in more complex form. This "formed food material" they obtain from decaying organic matter—in which case the Fungus is known as a Saprophyte—or by preying on a live host (plant or

animal) in which case the Fungus is known as a Parasite. Some Fungi can live both as saprophytes and parasites. As regards their mode of multiplication Fungi may grow from separated pieces of the mycelium, or from minute asexual bodies produced in immense numbers and known as gonidia or spores, or sexual multiplication may take place. All three kinds of multiplication may be found in the same life-history ; differences in environment and in the season may favour or induce one kind of multiplication rather than the other. As regards the absorption of water and food materials these may be taken in all over the surface of the mycelium or there may be special absorbing suckers which tap the food supplies and pass the absorbed material on to the mycelium.

Many crop plants suffer severely from the drain on them due to parasitic fungi. The mycelium may be external, as in the powdery mildews, when it can be directly reached by fungicidal dressings, but more frequently the fungus lives inside or between the cells of the host plant, so that the mycelium cannot be directly reached by fungicides, in which case preventive or remedial treatment is directed against the external spores.

The Leaflets of the Board of Agriculture (see List of Literature) should be consulted regarding the life-histories and treatment of the pests of individual crops, *e.g.* finger-and-toe in turnips, potato disease, potato scab, smut and bunt, gooseberry and other mildews, cankers, etc.

Fungicides

Bordeaux mixture.—A typical formula for 100 gallons of the wash is:

Copper sulphate	16 lbs.
Quicklime	11 lbs.
Water	100 gallons.

In preparing place the copper sulphate (blue vitriol) in a sack, and allow this to dip into nine gallons of water in a wooden tub. Then slake the quicklime in some water until a thick milk or creamy consistence is got. Then to each of the dissolved copper sulphate and the slaked lime add fifty gallons of water. Mix the two slowly and stir. Care must be taken in using Bordeaux mixture not to have it too strong, else the plants will suffer.

Potassium Sulphide or Liver of Sulphur.—This is a favourite spray against mildews and some rusts. The formula is 2 to 10 oz. of liver of sulphur in 10 gallons of water. Weak solutions are used where the foliage is tender, and stronger solutions according to the hardness of the foliage. This spray should not be made and kept, but should be made fresh for use.

Copper Sulphate.—1 lb. to 20 gallons of water dissolved in a wooden tub may be used as a winter wash (*i.e.* the treated plants must be dormant) against fungi.

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XI

FRENCH AND GERMAN PHONETICS

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*** This article is a continuation of that on the Phonetics of English, which should be read first

Introduction.—If we grant that one of the aims of modern language teaching is to ensure a correct understanding of the sounds of the foreign tongue as well as the ability to give a reasonably correct approximation to these sounds as pronounced by the foreigner, we see that in the teaching of modern languages a considerable proportion of our time should be spent at first in trying to overcome the difficulties of the mechanism of foreign sound-production and recognition ; because it is easier to prevent mistakes than to rectify them, and, especially if a wrong mode of production or recognition has become automatic through practice, we shall later on have to spend time and labour in correcting this out of all proportion to the results, and at a period in the pupil's development when he ought to be busied with quite different work.

It is useless, as things are at present, to assume that the pupil knows the rudiments of phonetics, the classification of English sounds, the place and manner of their articulation. These facts *should* be taught in the English class, but in all but a few schools the pupil arrives in the modern language class-room never having had his attention directed to the phonetics of his mother-tongue at all—just as in the old days boys learned no grammar in the mother-tongue, but received their first grammatical notions in connection with Latin. The teacher's first duty will, therefore, be to prepare the way for the phonetics of the foreign tongue by a few well-chosen examples from English. It is not necessary to treat English phonetics exhaustively, but at the same time common sense demands that we shall proceed from known sounds to unknown ones.

French Phonetics.—We shall take French first, as being the modern foreign language usually first taught in schools; and in French we shall begin with the consonants, for they are much easier than the vowels.

French Consonants.—The French consonants are:

VOICELESS

	Lip.	Lip-teeth.	Lip-front.	Lip-back.	Point-teeth.	Blade.	Blade-point.	Front.	Back.	Uvula.	Throat.
Open (Trill)		f				s	ʃ				
Div.											
Stop	p				t				k		
Nas.											

VOICED

Open (Trill)		v	ɥ	w	r	z	ʒ	j		R	
Div.					l						
Stop	b				d				g		
Nas.	m				n			ɲ			

It will be at once noticed that two types of consonants exist in French (leaving minor distinctions out of account), which do not appear at all in English: Front-nasal-voiced [ɲ], and Lip-front-open-voiced [ɥ]. The first of these is an [n] pronounced in the [j] position, and the nearest English equivalent to it is [n]+[j] as in "onion." Many French people, indeed, habitually pronounce [n] + [j] for [ɲ].[1] The second sound is harder to acquire. It is a sound like our English [w], but where in English we raise the *back* of our tongue and use it with the lips, in French the *front* or *middle* of the tongue is raised and used in connection with the lips. [ɥ] is, however, best acquired after the vowels, for just as [w] and [j] are closely connected with [u] and [i], [y] is related in the same way to one of the French vowels which we shall presently discuss.

Quite a number of French consonants are unvoiced when

[1] *V.* Passy, *Les Sons du Français*, § 191, 6me édition, Firmin-Didot, 1906, 1/.50.

they are found near voiceless consonants, so [ɥ], [j], [w], [m], while [l] and [r] are often unvoiced at the end of breath-groups: tab*le*, chèv*re*, and indeed disappear altogether in rapid colloquial speech. All French consonants are pronounced tense normally, not loosely as in English. French r may be point-trill (the variety recommended for public speaking and singing), or uvular trill (the pronunciation of the majority of native French speakers). The important fact about the r is that it is a trill, not an open consonant, as in Southern English, and that in French it is pronounced even before a consonant, where in English it is a mere orthographic sign. French l is point-teeth, whereas English l is point. French l moreover is pronounced with the tongue in the [i] position, whilst English l is pronounced with the tongue in the [u] position. The French voiceless stops are pronounced without a following aspiration (p, t, k). The French voiced stops and voiced open consonants are fully voiced throughout, like the English corresponding sounds in a medial position. It will be seen from the above that hardly one English consonant can be introduced into French without some slight alteration, and it is the sum-total of all these slight divergences which makes a French-French or an English-French pronunciation.

The aspirate and the glottal stop both exist in French irregularly, but no attention need be paid to them by the pupil. l mouillée [ʎ], *i.e.* an l produced in the [j] position, used to be found in standard French, but it has long since been replaced by [j], despite Littré, so that it also need not be taught.

French Vowels.—The French vowels are far more troublesome than the French consonants, especially for Southern English speakers. The French vowels are:

	Back.	Mixed.	Front.	Back.	Mixed.	Front.	
High ..			i				Unrounded.
Mid ..			e	a			Unrounded.
Low ..			ɛ ɛ̃	ɑ ɑ̃			Unrounded.
High ..	u		y				Rounded.
Mid ..	o		ø ə	2 ɔ̃			Rounded.
Low ..			œ œ̃				Rounded.
	Tense.			Slack.			

Probably the easiest series for an Englishman to begin with is the Front narrow series. He already possesses [ɛ], and by raising the tongue one degree and then keeping the mouth perfectly steady, he can arrive at [e]. The mistake the Englishman must be specially careful to avoid is that of diphthongising the e. A diphthong is a motion, a vowel is a position, hence he must take care to keep the mouth steady for [e]. Scotch speakers have not this difficulty to face. They probably possess both [i] and [e]. On the other hand, the Scotsman may not possess [ɛ], and in that case he must acquire it by lowering the tongue one degree from [e]. The [i] sound, if not already possessed, may be most easily arrived at by tensening the tongue from [I], or one may reach it by raising the tongue still further from [e].

The Scotsman may possess [u], and if so, all is well. He may, however, possess an advanced variety of [u], and then he will have to retract the tongue, or practise by raising the tongue from [o] which he probably possesses.

The Englishman will best arrive at [u] by tensening the tongue from [U], and then his greatest difficulty will be to produce a pure undiphthongised [o]. As in the case of [e], the mouth must be kept perfectly steady. The use of a small mirror to observe the motions of the mouth often helps one to recognise the difference between a diphthong and a pure monophthong. [ɔ] may be possessed by both English and Scotch. If not, it is easily acquired. In French this sound is often fronted.

[a] and [*a*] offer no particular difficulties. People do not generally possess both, but [a] can be got from [*a*] by raising the tongue one degree, whereas [*a*] can be got from [a] by lowering the tongue a similar amount.

The Front-rounded French Vowels.—We now arrive at two series of vowels possessed by neither English nor Scotch speakers: the front-rounded series and the nasalised vowels. Start from [i] and contract the lip-opening; pouting the lips generally helps. Be sure not to allow the tongue to shift from the [i] position. Keep the tongue steady and move the lips. If the pupil fails to reach the sound from the [i] side, start from [u], and push the tongue forward to the [i] position. This is not such a good plan as starting from [i] and rounding, for front vowels are rounded

vertically, but back vowels are rounded by lateral compression of the lips and cheeks; still it does produce a somewhat clumsy front-rounded vowel. The use of the mirror is strongly to be recommended here, and the lips can be pushed into position and held there by the thumb and forefinger of each hand. We denote the high-front-narrow-round vowel ([i] rounded), by [y]. Practise the sound, first by itself, then in the final position, then before a consonant—*e.g.* [*y*], [*py*], [*py*: *r*]. The consonant sound [*ɥ*] is merely the consonantised form of [y] and is most easily acquired after [y], by letting the friction of the breath upon the lips be heard.

By rounding in the very same way, only to a less extent, we arrive at [*ɸ*] from [e], and at [œ] from [ɛ]. [ə] in French is merely a "slightly retracted and partially unrounded" [*ɸ*] or [œ], the main point for foreigners to observe being that the sounds in "*reve*nir" (slowest possible pronunciation) *are* rounded.

The French Nasalised Vowels.—In English we possess on the one hand oral vowels where the breath passes wholly through the mouth, and on the other hand nasal consonants where the breath passes wholly through the nose. Nasalised vowels, where the breath passes partly through the mouth, partly through the nose, are not unknown in English, more especially in the American variety, but the French nasalised vowels are very fully nasal. Two mistakes we must guard against: starting from the wrong vowel and nasalising it, and adding [*ŋ*] at the end of the nasalised vowel. The vowels nasalised in French are four in number [*ɑ̃*], [*ɛ̃*], [*ɔ̃*], and [*œ̃*]. "*Cent dindons bruns.*" Start from [*a*] and try to divert part of the stream of breath through the nose, at the same time keeping the mouth position practically unchanged (Strictly speaking, the French nasals are [*ɛ̃ᵣ*], [*œ̃ᵣ*], [*ɔ̃ₗ*] and [*ɑ̃ₗ*]). Be careful not to close the mouth-passage by raising the back of the tongue so as to touch the soft palate. Practise the sound in as short a form as possible to begin with, then practise it in words short in the final position, then long before a consonant: *e.g.* [*ɔ̃*], [*lɔ̃*], [*lɔ̃*: *g*]. Unfortunately there is no way of pulling the soft palate into position, as one can pull the lips into position. The result can be tested quite easily, for if one adds [*ŋ*] after the nasalised

vowels, the presence of the [η] is at once detected by pinching the nose. If [η] is being pronounced, there is complete cessation of sound when the nose is pinched. If a nasalised vowel is being pronounced, the sound is muffled, but not completely stopped.

The Distribution of French Sounds.—It is quite impossible within the limits of a short article to give even an idea of the distribution of the French sounds and their representation. The student is referred to the published phonetic texts (Passy-Rambeau, *Chrestomathie Française*, Teubner, Leipzig, 1908², 5*s.* net, and many other texts), and to the most useful *International Dictionary*, by Pierce-Passy-Hempl, published by Jack, 7*s.* 6*d*; Nyrop-Philipot's *Manuel Phonétique du Français Parlé*, Picard, Paris, 1902², 4*s.*, also contains a short and useful survey of the various representations of French sounds.

The Outstanding Points of Synthesis in French.—One or two points of synthesis must receive at least mention here, but for a fuller treatment the reader is referred to Passy, *Les Sons du Français*. In French the stress normally falls on the last spoken syllable, but if for any reason special emphasis is desired, the stress is shifted usually to the first syllable in the word which does not begin with a vowel. French has open stress—that is to say, if a consonant stands between two vowels, it is pronounced with the vowel that follows, not with that which precedes. Sometimes even both the consonants l or r and the consonant which precedes them are joined to the following syllable.

Length of Vowels and Consonants.—Vowels in French are short when final, unless indeed the final short vowel is lengthened to obtain a special elocutionary effect. Short stressed final vowels are always troublesome to the English speaker. Vowels are long in final syllables if followed by [v], [z], [ʒ], [j], [r]—*i.e.* the voiced open consonants and [r]. Certain vowels are always long in final closed syllables whatever consonant follows: [o], [φ], and the four nasalised vowels. As for the length of vowels in the non-final syllables, the rules are fairly complicated and not of much practical use. Length is sometimes used to distinguish between like pairs of words ("renne" and "reine"), ("ami" and "amie" in elocutionary French); but there are numerous personal and local variations, and there is therefore no need for

English speakers to trouble specially about these. Double consonants are also met with in French, more especially in a careful pronunciation, and the use of the double consonant sometimes carries change of significance with it: "je mourais," I was dying; "je mourrais," I should die. Two such consonants as [k] and [t] following one another are not pronounced without a glide as in English. Cf. Fr. pacte and Eng. pact.

Intonation.—French intonation is best studied in France, but there are one or two outstanding features which deserve mention. There is greater variation of tone in French than in English, and the leaps up and down are more sudden. In English, in reading enumerations of objects, we generally raise the tone at each word. In French this is also done, but a more characteristically French intonation is to use first high then low pitch in enumerations. A most excellent aid in acquiring French intonation is the phonograph, or better still the gramophone; and most interesting graphical representations of intonation based upon gramophone records have recently been given by Mr. Daniel Jones, in his *Intonation Curves* (Teubner, Leipzig, 1909, 2*s.* 6*d.* net).

Assimilation.—Assimilation, *i.e.* change effected on a sound by some other sound in its vicinity, is common in French. Sometimes it is the first sound which affects the second, as when the [ɥ] of [pɥi] becomes unvoiced; more often it is the second sound which by anticipation affects the first, as when the [b] of "absolu" becomes [apsɔly].

Elision.—The elision of (ə) is also of common occurrence in French. It is allowed when two consonants at the beginning of a breath-group, or three in the middle of a group, do not clash. It is sometimes allowable to have three consonants in the middle or two at the beginning of the group if the first or last consonant of the resulting group is [r], [l], [j], [ɥ], or [w]. [ə] cannot be elided in certain words, *e.g.* "premier." If a series of [ə] sounds with intervening consonants follow one another, [ə] is alternately dropped and kept: "je ne le ferai pas" [ʒə nə lə fəre pa] = [ʒən ləfre pa].

Liaison.—In French certain consonants disappear and reappear in liaison. The feminine form of adjective is generally used in liaison, but the stops, here as in other words, are always voiceless,

and the open consonants are voiced: grande = [ɡ rɑ̃ : d], "un grand homme" = [œ̃ ɡ rɑ̃t ɔm]; grosse = [ɡ ros], "un gros homme" = [œ̃ ɡ ro-z ɔm]. There are one or two exceptions to this rule: "franc," "commun," etc. The nasalised vowels in liaison develop [n], and often become more or less denasalised. Liaisons are made more frequently in elevated style than in conversation. If the words are closely related in sense, then make the liaison if occasion offers. If there is the slightest pause, do not make the liaison. Rather err on the side of making too few liaisons than too many. Wrong liaisons (cuirs, velours, pataquès) are a mark of insufficient education. They abound in the folk-song *e.g.* "Malbrough s'en va-t'en guerre." The liaison of the infinitives of the first conjugation belongs to elevated style only, and sounds stilted in conversation.

German Phonetics.—The consonants in German are:

VOICELESS

	Lip.	Lip-teeth.	Point.	Blade.	Blade-point.	Front.	Back.	Uvula.	Throat.
Open		f		s	ʃ	ç	x		
Div.									
Stop	p		t				k		ʔ
Nas.									

VOICED

Open		v	r	z	ʒ	j		R	
Div.			l						
Stop	b		d				g		ʔ
Nas.	m		n				ŋ		

It will be seen from the above table that Scotch speakers have no new type of consonant to learn in German, if we allow the use of [r], the trill always demanded in public speaking and public singing. The English speaker will have to acquire [ç] either by unvoicing [j], or by pronouncing the vowel [i], unvoicing it, and then increasing the height of the tongue till friction is produced. He will also have to acquire [x], probably best from [k]. Pronounce a very weak [k] and prolong the weak off-glide. This will give a rudimentary [x], which only requires to be strengthened.

German voiceless stops (in Standard North German) are followed by [h]. German voiced stops are fully voiced; the breath driven in before the closure of the stop is loosened, forming the "Bläh-laut" of the German phoneticians. German [f] and [v] are formed very loosely, hence [v] often changes into *lip*-open-voiced after [ts] "zwei," [ʃ] "Schwester," and [k] "Qual," even in North Germany, while lip-open-voiced (not to be confounded with our lip-*back*-open-voiced [w] in English) is the regular sound both for [b] and [v] in Middle and South German. It is superfluous to teach this sound to English speakers, but if desired it can easily be derived from "blow to cool" by voicing. German [ʃ] and [ʒ] are always pronounced with protruded lips, and this rounding of the lips can be noticed even with [x] after a back-rounded vowel ("Buch," "auch"). German [l] is pronounced with the tongue in the [i] position. It is "i-haltig," in opposition to English [l], which is "u-haltig."

The aspirate [h] exists in German, and the glottal stop is used initially before all vowels, and even medially after German prefixes. The English speaker must be careful not to carry on the final consonant of one word ("herüberziehen") to the initial vowel of the next. He must at least pause ("absetzen"), even if he does not pronounce stressed clear beginning, *i.e.* the glottal stop. The presence or absence of the glottal stop is most easily detected by whispering. In certain parts of Germany the voiced form of [x] is used medially for [ɣ], *e.g.* in "Tage." It is superfluous to teach this sound also, for [ɣ], which we possess, is the sound recommended by the advocates of the "Bühnenaus-sprache" or stage pronunciation of German, which certainly forms a convenient standard for the foreigner.

All consonants in German are voiceless in the final position except [r], [l], and the nasals, unless indeed a vowel is elided, *e.g.* "hab' ich," when the b may be pronounced [p] or [b]. [g] is the most troublesome consonant. Finally it may turn into [k], [ç], or [x]. The [k] pronunciation is always allowed except in the termination -ig (unless when "-lich" follows); the [ç] pronunciation is only possible after a front vowel, the [x] pronunciation after a back vowel.[1]

[1] See Siebs, *Grundzüge der Bühnenaussprache*, Ahn, Cöln, 2*s.*, 4th edition (no year).

Quite a number of mistakes are made by English speakers because they do not realise that familiar sounds are difficult in unfamiliar places, or because they allow themselves to be misled by the spelling. For instance, [ts] is a perfectly familiar combination in English finally; in German it is often found initially, as in English "tsetse." [ns] and [ls] are quite well known, but not with the spelling ns, ls, which in English is interpreted [nz], [lz]. Words like "once," "since," "else," are most useful in getting right the pronunciation of "Gartens," "Himmels." ng in English means either [ŋg] or plain [ŋ], leaving [n dʒ] out of account. In German, leaving out some rare exceptions, ng always follows the model of "ringer" and never the model of "finger." Final consonants in German are always short.

The German Vowels are:

	Back.	Mixed.	Front.	Back.	Mixed.	Front.	
High ..			i:			I	Unrounded.
Mid ..		ə	e:	aa:		ɛɛ:	
Low ..				ɑ			
High ..	u:		y:	U		Y	Rounded.
Mid ..	o:		:	ɔ		œ	
Low ..							
	Tense.			Slack.			

In borrowed French words containing [ãː], [ɛ̃ː], [ɛ̃ː], [œ̃], it is best to pronounce these, and not the North German substitutes. It will be seen from the above table that certain sounds are practically the same in German as in French, and must therefore be acquired in the same way by the English speaker. [y], strictly speaking, is an over-rounded form of Fr. [ø], but high-front-narrow-round will probably pass undetected by the great mass of North Germans, and it is the artificial rounded pronunciation common in the South. [Y] can be obtained by rounding [I], [œ] by rounding [ɛ]; [ə] is tense in German, not slack as in English.

German Diphthongs.—There are in German three types of diphthongs, just as there are three in English, "fine," "house," "boy." In German the first element of [au] is really low = [ɑU], the [æI] pronunciation of [aI] is unknown, and the second ele-

ment of [ɔi] is rounded, but these are minor differences. The German [ui] diphthong in "Pfui!" may be safely ignored.

Length.—Length is comparatively easy in German. The tense vowels in words of German origin are always long, with the exception of [ə]; the slack vowels are always short, with the exception of [å] and [ɛ], which occur both long and short. (Väter, Männ; Väter, Vetter.) Length can easily be discerned in uncompounded words of German origin, for if the vowel stands at the end of the syllable, it is long; if a consonant closes the syllable, the vowel is short. A single consonant standing between vowels is reckoned with the syllable following. To determine the length of the vowel in weak verbs, take the infinitive; to determine the length of the vowel in nouns or adjectives, take an inflected case. "Grāb" is long, because "Grā/bes" is long; "rōt" is long, because "rō/tes" is long. There are one or two exceptions. "Städte" is long, although "Stadt" is short. "gro/bes" is long, although "grob" is short. The length of the vowel in words terminating in ß (sz) must also be determined by an inflected form. Flŭsz is short, because the genitive is Flŭs/ses, and the sz changes into ss. Fūsz is long, because the genitive is Fū/szes, and the sz is kept, which counts as a single consonant. N.B.—The length in German is determined from the spelling. Fuller information, however, should be sought in the transcripts of Professor Viëtor (*Aussprache des Schriftdeutschen*, Reisland, Leipzig, 1909[7], 2*s.* 3*d.*), and in his *Deutsches Aussprachewörterbuch*, Reisland, Leipzig, 1908 ff., of which four parts have already appeared, the whole to cost about 10*s.*

Stress.—German uncompounded words are accented on the root-syllable. (Exceptions: Forélle, lebéndig, and one or two others.) Foreign words often keep their own accentuation, but also often change (Café, with the accent on the last syllable, but Káffee with the accent on the first). In compounds, the limiting part receives the accent (Háustür, but Jahrzéhnt). The same words in the sentence receive the accent as in English (logical stress), but owing to the German word-order these words often appear in unaccustomed places. The English student should be careful not to put stress on auxiliaries, past participles, or infinitives, unless for some special reason they are meant to re-

ceive the stress. Intonation in German is very like English intonation.[1]

Application to Teaching.—When we come to consider the pedagogic consequences of our theory of French and German Phonetics, it is apparent that every little difference between English and French and German pronunciation goes to make up the big difference between a good pronunciation and a bad one, and so in the class-room we should insist upon as many of these points as we can. In French the minimum is [r], [ɥ], undiphthongised vowels, the front-rounded vowels and the nasalised ones ; in German [ç], [x], and the front-rounded vowels, and this leaves perfectly untouched the question of the distribution of the sounds.

Method with a Class.—In beginning French or German with a class, the first step, after making friends with the class and getting reasons why it was desirable to learn foreign languages, is to find out the sounds the class possesses and then teach the new sounds upon that basis. The kind of lesson to be given is well described in Jespersen, *How to Teach a Foreign Language*, Sonnenschein, 1904, 3*s.* 6*d.*, ch. x., but each teacher will elaborate his own first lesson. The great bugbear with most teachers who have never tried it is the phonetic script. The timorous will have nothing to do with it, the moderates write it themselves and permit the pupils to read it, but not write it. The reader is referred, as in the article on Modern Language Teaching, to Kirkman's *Teaching of Foreign Languages*, Clive, 1909, 1*s.*

Precautions in the Use of the Script.—If the teacher does determine to employ the script, great care must be taken that the pupils do not learn it as a new spelling, but as a real representation of sounds. Hence outwardly as much difference should be made as possible by *printing* phonetic script with *coloured* chalk, and *writing* the ordinary spelling with *white* chalk. Nothing but the script should be used at first, and the transition to ordinary spelling should be made by working over the same ground again as was covered in script. It is a good plan to begin with a song, as Quiehl does in his *Französische Aussprache u. Sprachfertigkeit*, Elwert, Marburg, 1906[4], 5*s.* 9*d.* net. No doubt scraps of phonetic

[1] See Hempl, *German Orthography and Phonology*, I., Ginn, Boston, 1898, 9*s.*

French or phonetic German may occur in the pupils' exercises at first, but they will not often recur, and they show that the pronunciation at least is right. In German one might almost do without the use of the script, though even there the script ensures clearness and shows up mistakes; in French, where the spelling is far removed from the sounds, it is impossible to be clear without some kind of special notation.

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